THE UNIVERSITY OF ALBERTA

THE RELATIONSHIP BETWEEN EDUCATION AND EARNINGS

AMONG THE CANADIAN PROVINCES

by

© PHILIP JAMES HUSBY

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF DOCTOR OF PHILOSOPHY

DEPARTMENT OF EDUCATIONAL ADMINISTRATION

EDMONTON, ALBERTA

OCTOBER, 1968

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and recommend
to the Faculty of Graduate Studies for acceptance, a thesis entitled
"The Relationship Between Education and Earnings Among the Canadian
Provinces" submitted by Philip James Husby in partial fulfilment of
the requirements for the degree of Doctor of Philosophy.

ABSTRACT

This study was concerned with the economic value of education in Canada. The general purpose of the investigation was to analyse differences in educational attainments of the adult populations of the Canadian provinces, and to determine differences among the provinces in the relationship between education and earnings.

The data used in the study were obtained principally from the 1961 Census of Canada. Wherever possible, tabulations from 1951 and 1941 census reports were employed to serve as a check on findings derived from 1961 data.

The general findings of the study suggest that differences in the level of schooling of adults have an important bearing on Canadian regional income disparities. Very substantial differences were found in the educational attainments of adult provincial populations, and strong positive relationships were found to obtain, both in 1961 and in 1951, between average provincial educational levels and average provincial income levels.

Within each province increased schooling was found to be directly related to increased annual and lifetime earnings. However, large differences were found when interprovincial comparisons were made of average earnings associated with specific levels of educational attainment.

The results of the study suggest that interprovincial differences in earnings accruing to persons with given levels of educational

attainment are greatest for persons having lesser amounts of schooling, while differences are least for those with the equivalent of junior and senior matriculation. Differences in all educational level classifications were greatest for persons in the beginning and final years of the normal working career, and tended to be smaller during the middle years of the normal work span.

In order to determine the relative significance of differences in education of provincial populations in accounting for interprovincial income disparities, a set of correlational relationships were determined between several factors often cited as being associated with Canadian regional income differences and two 1961 average provincial income measures. The results of this analysis indicate that differences in educational attainments of adult provincial populations were more closely related to Canadian income disparities than each of the other factors employed.

A brief examination of data descriptive of Canadian metropolitan areas tended to confirm the close association between average educational levels and average income levels. A tentative finding from this part of the study suggests that the relative concentration of persons with secondary schooling may be more closely related to average income levels than is the relative concentration of persons with university education.

Differences among provinces in average incomes of individuals with elementary schooling tended to be inversely related to the relative concentrations in the provinces of persons with elementary schooling.

Conversely, statistically significant positive relationships were found between average earnings of persons with from three to five years of secondary schooling and with university degrees and the relative concentrations of such persons within provinces.

Differences in the education-earnings relationship among the Canadian provinces suggest a number of implications in the area of educational finance. These are briefly discussed in the final chapter of this report.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

THE PROBLEM

I. INTRODUCTION

During recent years the conviction has grown that expenditures

for education constitute an investment in human capital. There is an

increasing realization that "education and training are every bit as

important in contributing to productive capacity as raw manpower and

physical capital."[1] Numerous studies that have been carried out in

several parts of the world using a variety of approaches have demon-

strated that the educational level of a population plays an important

role in determining the level of economic welfare enjoyed by that popu-

lation.[2]

One set of such studies deals with the question of the returns

to individuals who have differing levels of educational attainment.

These investigations have demonstrated a high correlation between

educational level and earnings.[3] Persons with many years of schooling

on the average earn more, both annually and during their lifetimes,

than do persons with fewer years of schooling, even when such factors

as differences in levels of intelligence are considered.[4]

When Canada is considered as a national unit similar findings are

reported. A recently published study by J. R. Podoluk for the Dominion

Bureau of Statistics has shown that the education-earnings relationship

holds true in the Canadian situation.[5] The findings of the Podoluk

investigation, based on 1961 census data, indicate that the total undis-

counted lifetime earnings of Canadian non-farm labour force males varied

from $148,449 for persons with from five to eight years of elementary

schooling, to $222,676 for high school graduates and $357,675 for

those with a university degree.[6]

Canada, however, is a federal state, and the provinces, the

principal political subdivisions within the federation, have many

important responsibilities assigned to their private jurisdictions. One

of the more important provincial concerns is education. The Canadian

constitution, in Section 93 of the British North America Act, specifies

that education is the exclusive responsibility of provincial legisla-

tures.[7] As a result, each province has established an education system

which is, with certain exceptions,[8] entirely responsible for the provi-

sion of educational services to its own population. Despite numerous

similarities among the ten provincial school systems in Canada, many

distinct differences have been found when interprovincial comparisons of

educational services have been made.

One such important difference concerns the length of time that

pupils remain in formal educational programs. A study by J. E. Cheal

found substantial differences among provincial school systems in pupil

retention rates.[9] As a result of these differences over time, there have

been noted major differences in the educational levels of provincial

populations.[10]

Another important feature of the Canadian federal system relates

to the regional nature of economic activity within the country as a

whole. Because of numerous geographic, sociological, demographic, political and constitutional factors, there have developed within the nation several relatively distinct economic regions, each with special problems and circumstances which make it difficult for balanced economic development to take place within the total national unit. Some economists have argued that the individual provinces may be regarded as "true economic regions."[11] In this connection, the Economic Council of Canada has stated:

> An economic region is a geographic area that is essentially homogeneous in respect to one or more important attributes. Among these may be included physical features and resources, structure of economic activity, market size, economic performance, administrative jurisdiction and social and cultural features. Many studies devoted to the question of defining economic regions conclude that there is no unique definition that satisfies all requirements; instead the appropriate definition will depend upon the purpose of the analysis. . . .
>
> We have, therefore, accepted the boundaries of the ten provinces as defining the regions with which we should be concerned, despite the fact that they are not always compatible with strict geographic or economic criteria.[12]

One of the most serious problems of Canadian economic development is associated with differences in wealth among the provincial regions. A number of studies have indicated that Canadian interprovincial income disparities have been both persistent and of critical magnitude.[13] S. E. Chernick has reported that:

> Over a period of Canadian economic history spanning almost forty years, the interregional structure of income has hardly changed; and the degree of regional participation in national economic activity that obtained in the mid-sixties is much the same as it was in the mid-twenties.[14]

The Economic Council of Canada noted the problem of regional economic divergencies in this way:

Our analysis has shown that over a period of almost four decades--embracing buoyant expansion, a severe depression, a prolonged war, and a period of revived national growth--the regional problem in Canada has remained relatively unchanged. Large interregional disparities in per capita income have stubbornly persisted despite various forces working toward better balance.[15]

Thus in Canada there are two related problems--the one associated with provincial responsibilities in the field of education, which has apparently resulted in major differences in average levels of educational attainment of adult provincial populations, and the second relating to interprovincial income disparities. Because of the interrelationship between educational levels and income among population groups, differences in the level of educational attainment may have important implications for the growth and development of economic activities within provinces, and for the economic well-being of their populations. This study is designed to examine in detail differences in the education-income relationship among the Canadian provinces.

II. STATEMENT OF THE PROBLEMS

This study was designed to examine two distinct aspects of the education-earnings relationship among the Canadian provinces, and from these were derived two major problems which formed the basis of investigation for the study.

The Purposes of the Study

The first major purpose of this investigation was to determine the degree of relationship that exists between average levels of educational attainment of provincial adult populations and average

provincial income levels. It has been generally assumed, because of the close association that has been found to exist between education and earnings of individuals, that regional income disparities in Canada could be explained to a considerable extent by differences in average levels of schooling of the populations concerned. Thus the Economic Council of Canada has stated:

> There is a close association between average income and the level of educational attainment; substantially higher average earnings accrue to those who have significantly higher levels of educational attainment. The average level of educational attainment within any region will therefore have an important bearing on the average level of income in that region.[16]

However, many other factors may be responsible for interprovincial income differentials: differences in natural resource endowments, the degree of industrialization, et cetera, so that the effects of differences in population educational levels may be masked or overshadowed by differences in these other factors. No detailed statistical analysis has yet been made to determine whether there is a close relationship between the educational levels of the adult populations of the Canadian provinces and average provincial income levels.

Thus, the first major purpose of this study was to examine available data to confirm or deny the contention which holds that one of the major factors related to average income differentials among the Canadian provinces is concerned with differences in levels of educational attainment of provincial populations.

The second aspect of the education-income relationship that is examined in this study relates to interprovincial differences in average earnings accruing to persons having equal amounts of schooling. While

it has been generally recognized that differences in average levels of educational attainment among provincial populations may be responsible for a large part of interprovincial income differentials, little attention has been paid in Canada to the possibility that average earnings of persons having essentially equal amounts of schooling may show marked regional variations. The conventional wisdom suggests that average earnings of persons with a given level of schooling are relatively similar throughout the nation. This view was explicitly put forward in a recent article in The Financial Times of Canada, as follows:

> Workers with similar education will earn similar incomes, despite regional disparities in aggregate incomes. For example, a person with grade VIII education will earn the same amount in the Maritimes, Ontario or the United States. But the lower average educational attainment in the Maritimes means that per capita income is much less there.[17]

There has been little research carried out to determine if there are significant differences in the education-earnings relationship among the Canadian provinces. Some studies have examined regional differences in earnings accruing to persons having specific occupational training, such as engineers and scientists,[18] but no studies have examined such regional variations across a broad range of educational attainments.

The second major purpose of this study was to determine whether Canadians having similar levels of schooling achieve reasonably similar annual and lifetime earnings in the several Canadian provinces, or whether there are significant differences among the provinces in this regard.

The Major Problems

The two major problems which were examined in this study may be stated in the form of questions as follows:

Major problem one. Is there a significant relationship between the average levels of educational attainment of the adult populations of the Canadian provinces and average income levels in these provinces?

Major problem two. Are there significant differences among the Canadian provinces in average annual and lifetime earnings accruing to persons having similar levels of educational attainment?

Statement of the Sub-Problems

In order to determine answers to the major problems outlined for the study, answers to a number of sub-problems were obtained. The following sub-problems were examined:

1. What is the extent of differences in average levels of educational attainment of Canadian provincial adult populations?

2. What is the extent of differences in average provincial incomes in Canada?

3. Is there a significant relationship between average provincial income levels and average levels of educational attainment of provincial adult populations?

4. What are the average annual earnings within each of the Canadian provinces that accrue to persons having several specific levels of educational attainment?

5. Are there significant differences among the Canadian provinces in average annual earnings accruing to individuals with specific levels of educational attainment?

6. Are there significant differences among the Canadian provinces in average total and marginal lifetime earnings accruing to individuals with specific levels of educational attainment?

III. DATA SOURCES AND METHODS

The majority of the data examined in the present study were taken from decennial Census of Canada reports, and from the National Accounts, Income and Expenditure publications issued periodically by the Dominion Bureau of Statistics. Data from the 1961 census were most frequently employed because this was the best source of recently available material that was pertinent to the study. Wherever possible, figures from other census years were employed to determine if findings based on 1961 data were also applicable in other years.

For the determination of the education-earnings relationship within provinces, two specific tabulations from the 1961 Census of Canada were utilized. The first, based upon population sample data,[19] provided figures relating individual average incomes of provincial males and females associated with six levels of schooling. The second, based upon family and household characteristics,[20] provided for each province average annual earnings of family heads associated with eight levels of educational attainment and several age classifications. Because of the need for provincial income figures classified by both

education and age to permit detailed comparisons among provinces of
annual and lifetime earnings associated with various educational
levels, this latter source was used extensively in the examination of
the second major problem. The specific limitations of these data
for the purposes of this study are dealt with in the relevant section
of this chapter.

The statistical treatment of the data used in the study
included the determination of correlational relationships between
education and income figures for the provinces, and the calculation of
various sets of index numbers to show variations from the Canadian
average of average provincial incomes and earnings. The coefficient of
variation, defined as the standard deviation divided by the mean, was
extensively used to measure the degree of variation among the provinces
in average earnings associated with particular levels of schooling. The
significance of such variations was determined by comparing calculated
values with coefficients of variation found among the provinces in such
commonly used average income measures as personal income per capita and
earned income per employed person.

IV. SIGNIFICANCE OF THE STUDY

The existence of substantial income disparities among the Canadian
provinces has been one of the most serious problems plaguing the Canadian
federal system. The Economic Council of Canada has outlined this
problem as follows:

> . . .This concern for regionally balanced economic development
> consistent with rapid growth for the country as a whole, is easily

understood. Even fairly small industrial countries, possessing
only limited land area and closely integrated national economies
have experienced significant interregional disparities in growth
and levels of income. In Canada, the physical immensity of the
country, the presence of distinct geographic barriers, a narrow
uneven chain of settlement, and a striking diversity of resources
and economic structure among our major regions all make for a
particularly high degree of regional differentiation. It is not
surprising, therefore, that the problem of integration and balance,
in the sense of assuring an appropriate participation on the part
of each region in the over-all process of national economic
development, has long been an elusive goal and a continuing con-
cern of the people of Canada.[21]

Attempts to identify the specific factors that are responsible

for these persistent income disparities have met with little success.

A recently reported study by Frank T. Denton[22] illustrates the diffi-

culties involved in attempting to explain through statistical analysis

the variations in income among the Canadian provinces. Using standardi-

zation analysis, Denton tested a number of factors--differences in

employment and labour force participation rates, age composition, hours

of work, weeks of work, rural-urban population distributions, and

differences in average levels of education---normally considered

responsible for Canadian regional income disparities. He reported his

conclusions as follows:

> The significant conclusion is a negative one: even at the
> level of mere statistical distributions, the factors examined
> do not account for much of the observable variation in earnings;
> something more basic must be sought.[23]

In his analysis Denton considered only the five major economic

regions in Canada--the Maritimes, Quebec, Ontario, the Prairie region

and British Columbia; and he employed just three education level

categories: those who did not go beyond elementary school, those

with secondary schooling and some university education, and those with

university degrees.[24]

The present study was designed in part to re-examine the data used in the Denton analysis and, by employing refinements in data utilization, to re-evaluate the effects of educational level differences in explaining Canadian interregional income disparities. Where Denton considered the five major economic regions and three educational level classifications, this study considers the ten provinces as constituting distinct economic regions, and employs a larger number of educational level categories in the analysis.

This study is also significant because of its examination of the second major problem--that of differences among the provinces in average earnings accruing to individuals with specific levels of schooling. This very significant question has not been given its proper attention in Canadian research up to this date.

Research dealing with regional differences in earnings associated with specific occupational training and educational background in Canada has been very limited. The Rosenbluth study, previously cited, used regression analysis to determine the influence of four factors, experience, function, industry, and region, on salary differentials among several thousand Canadian engineers and scientists in the early 1950's. As regards the influence of regions in accounting for salary variations that were found, Rosenbluth reported that, "It is. . .clear that regional differences are the least important factor, and in most cases their contribution to salary inequality is negligible."[25]

Rosenbluth further concluded as follows:

The only safe conclusion is that in many professional occupa-
tions it is doubtful whether there are real regional differences
in earnings. Where there is evidence of such differences, they
do not follow the pattern of over-all regional differences in
income. . . .Regional differences are generally small.[26]

The Rosenbluth study examined only one occupational group, and

one which represented a relatively highly educated segment of the

Canadian work force. Many studies have shown that geographic mobility

of labour force members is greatest for those who are highly educated;[27]

hence regional variations in earnings for such highly mobile occupa-

tional groups would tend to be smaller than for persons with lesser

amounts of schooling who make up the major proportion of the working

population of the country.

The present study examines regional differences in earnings for

persons having several levels of educational attainment, from those

having no schooling to persons possessing university degrees.

V. ASSUMPTIONS

A number of assumptions are made in this study, most of which

are detailed in the relevant sections of this document. There are,

however, two basic assumptions dealt with in this section. The first

relates to the comparability of reported levels of educational attain-

ment among provinces and in different census years. The second concerns

statistics on income that are employed in this study.

Comparisons of Educational Levels of Canadians

Because of differences among Canadian provincial school systems,

extensive immigration and interprovincial migration, and the fact that

Canadian adults received their formal schooling over a span of several decades, much difficulty is experienced in attempts to determine equivalence of census tabulations of the educational backgrounds of the provincial adult populations of Canada. For the purpose of this investigation it was assumed that a year of schooling attained in any province in any year was equivalent to a year of schooling attained in the same or any other province or elsewhere, and in the same or any other year.

A further problem in educational level equivalence derives from Canadian census tabulations. The 1951 census reported educational levels of the population on the basis of the number of years of school attended; the 1961 census tabulations of population educational levels were based upon individual responses to a question relating to the highest grade attended. In order to determine changes in average levels of educational attainment of provincial populations between 1951 and 1961, it was assumed that the census reports for these two years measured population educational levels in relatively similar ways.

Incomes of Canadians

The best available source of data relating income, age and educational levels of Canadians is the Census of Canada tabulations. This study has utilized 1941, 1951 and 1961 census figures. There are certain inadequacies present in these tabulations. The only statistics which provide provincial income figures classified according to age and schooling in sufficient detail for the purpose of this study apply to "family head" rather than to individuals. Income figures reported in the

family and household tabulations refer to "income from employment," and exclude such income items as transfer payments to individuals, invest-ment income, and income from such miscellaneous sources as private pension plans. For the purpose of the study, it was assumed that these employment earnings represent actual income figures. It was further assumed that differences in reported incomes of Canadians that were present in the year preceding the census were representative of average Canadian income differentials over the years.

VI. DELIMITATIONS

This study was delimited to a macroscopic, cross-sectional examina-tion of education-income relationships among the provinces of Canada, with particular reference being given to the decennial census year of 1961. The Yukon and Northwest Territories were not included in the study, because their geographic isolation and small populations suggest that they should be given separate consideration. The reliance upon census data for education and income statistics precluded more recent calculations than for 1961. Since the major analysis has dealt with provinces as economic units, characteristics examined refer to provin-cial averages only. Data descriptive of Canadian metropolitan centres were utilized briefly in Chapter VII, principally to serve as a check on findings derived from provincial statistics.

The study was delimited to the consideration of formal public schooling only. The census does not supply data relating to education received in trade schools, on the job, or through other formal and

informal methods.[28]

VII.   LIMITATIONS

Because of inadequacies of available data, and the assumptions and delimitations that have to be imposed upon investigations such as this, the results which are obtained must be treated with a measure of caution.   Some of the limitations of the present study are outlined below.

Census data relating education and income are presented in relatively broad groupings. For this study, it would have been preferable to have figures showing specific average earnings within provinces of persons with, for example, exactly eight, twelve and thirteen years of schooling. Census tabulations, however, provide such data in gross categories, such as for persons with from five to eight years of elementary schooling, and for those with twelve and thirteen years of schooling combined. Similarly, recent census reports have shown separate categories for persons with university degrees, but there is no way of determining the number of persons with advanced degrees within the various provinces. Thus when average earnings of persons with university degrees are determined for the provinces, it must be assumed that within each province those having university degrees have received essentially similar university training as persons possessing university degrees in other provinces.

Data relating earnings to educational level categories represent income for a period of one year only. If earnings for the year

in question were not representative of average earnings over a longer

period of time, the results may be invalid. An attempt has been made

to minimize the possibility of bias in this respect by making estimates

based on more than one set of income figures. For example, variations

among the provinces in average earnings associated with various levels

of schooling were determined from both 1961 and 1941 data.

Two further specific shortcomings are present in the data used

in this study. Figures employed relating educational levels and

earnings of Canadian provincial populations for 1961 were obtained

principally from two sections of the 1961 Census of Canada. The first

was population sample data, in which tabulations were presented for a

twenty per cent sample of the Canadian population, while the second

was based upon data relating to family heads. Both of these sets of

data have certain limitations for the purposes of the study.

Population sample data provide information concerning total

income during the year ending May 31, 1961 of Canadian males and

females in the non-farm population aged fifteen and over classified

into six levels of educational attainment but not by age. Average

income figures in these tabulations are presented for all persons aged

fifteen and over, whether employed or not, during the one-year period.

Of the 4,977,296 Canadian non-farm males fifteen years of age and

over included in the sample, 369,252, or 7.4 per cent,[29] were without

income during that year. This number would include students in full-

time attendance in secondary schools and universities, persons

institutionalized and infirm, and others entirely unemployed. Hence

average annual earnings presented in these data do not reflect actual
annual earnings of persons employed. And, as was noted, these figures
exclude the farm population of the provinces.

Data of average earnings of family heads during the year pre-
ceding May 31, 1961 for Canada and the provinces are classified into
several age categories and eight levels of educational attainment, and
were used in this study for the determination of annual and lifetime
earnings of persons having these eight levels of schooling. The
4,554,493 Canadian family heads enumerated in the 1961 census consisted
of 3,962,719, or 87.0 per cent males, and 591,774, or 13.0 per cent
females.[30] It is possible that the inclusion of this percentage of
female membership among the household head group will limit the findings
of the study to a certain extent in terms of their generalizability
with respect to provincial male populations.

VIII. ORGANIZATION OF THE STUDY

There are eight chapters in this report. In Chapter II a brief
examination of the relevant literature is presented as a background to
the present research. Chapter III examines the educational levels of
the total Canadian adult population and of the adult males and females
of the provinces. In Chapter IV average income levels of the Canadian
provinces are determined, and these are related to the average provin-
cial educational levels presented in Chapter III. In Chapters V and
VI interprovincial differences in annual and lifetime earnings accruing
to individuals having similar schooling are determined. Some factors

associated with interprovincial differences in the education-earnings

relationship are examined in Chapter VII. The final chapter provides

a brief summary and statement of the major findings of the study,

together with certain implications for educational finance arising

from them. Recommendations for data collection and presentation in

future census reports and for future research in related areas complete

this final chapter.

FOOTNOTES FOR CHAPTER I

[1]Herbert S. Parnes, Forecasting Educational Needs for Economic and Social Development (Paris: Organization for Economic Cooperation and Development, 1962), p. 7.

[2]Vide: M. Blaug, The Economics of Education. A Selected Annotated Bibliography (Oxford: The Pergammon Press, 1966), for a comprehensive review of international studies in this area.

[3]Gary S. Becker and Barry R. Chiswick, "Education and the Distribution of Earnings," American Economic Review, LVI:2 (May, 1966), pp. 358-69; W. Lee Hanson, "Total and Private Rates of Return to Investments in Schooling," Journal of Political Economy, LXXI (1963), pp. 128-40; and H. Correa, The Economics of Human Resources (Amsterdam: North Holland Publishing Company, 1963), Chapter 8.

[4]D. Wolfe and J. G. Smith, "The Occupational Value of Education for Superior High School Graduates," Journal of Higher Education, XXVII (1956).

[5]J. R. Podoluk, Education and Earnings (Ottawa: The Dominion Bureau of Statistics, December, 1965).

[6]Ibid., p. 59.

[7]Statutes of Great Britain, 30-31 Victoria, Ch. 3 (1867), S. 93.

[8]Certain responsibilities in education have been retained by the federal government in the Canadian provinces: for Indians, dependents of Department of National Defence personnel, etc. Vide: Dominion Bureau of Statistics, The Organization and Administration of Public Schools in Canada (third edition; Ottawa: The Queen's Printer, December, 1966), Chapter 12.

[9]John E. Cheal, Investment in Canadian Youth (Toronto: MacMillan Company of Canada, 1963).

[10]Economic Council of Canada, Towards Sustained and Balanced Economic Growth (Second annual review; Ottawa: The Queen's Printer, 1965), pp. 117-20.

[11]Anthony Scott, "The Economic Goals of Government Finance," Public Finance, III (1964), p. 242.

[12]Economic Council of Canada, op. cit., p. 98.

[13]Alan G. Green, "Regional Aspects of Canada's Economic Growth, 1890-1929," Canadian Journal of Economics and Political Science, XXXIII:2 (May, 1967), pp. 232-45.

[14]S. E. Chernick, Interregional Disparities in Income (Ottawa: The Economic Council of Canada, Staff Study No. 13, August, 1966), pp. 11-12.

[15]Economic Council of Canada, op. cit., p. 139.

[16]Ibid., p. 119.

[17]The Financial Times of Canada, February 26, 1968, p. 5.

[18]Gideon Rosenbluth, "Salaries of Engineers and Scientists," Papers, Canadian Political Science Association, Conference on Statistics, 1960. Eds. E. F. Beach and J. C. Weldon (Toronto: University of Toronto Press, 1962).

[19]1961 Census of Canada, Volume IV.

[20]1961 Census of Canada, Volume II.

[21]Economic Council of Canada, op. cit., p. 97.

[22]Frank T. Denton, An Analysis of Interregional Differences in Manpower Utilization and Earnings (Ottawa: The Economic Council of Canada, Staff Study No. 15, April, 1966).

[23]Ibid., p. 13.   [24]Ibid., p. 12.

[25]Rosenbluth, op. cit., p. 152.   [26]Ibid., p. 179.

[27]Isabel B. Anderson, Internal Migration in Canada, 1921-1961 (Ottawa: The Economic Council of Canada, Staff Study No. 13, March, 1966).

[28]For an extensive report on the total "knowledge industry" in the United States, Vide: Fritz Machlup, The Production and Distribution of Knowledge in the United States (Princeton, N.J.: Princeton University Press, 1962), pp. 51 ff.

[29]1961 Census of Canada, Volume IV, Table A-10.

[30]1961 Census of Canada, Volume II, Table 84.

CHAPTER II

THE RESEARCH BACKGROUND

I. INTRODUCTION

The purpose of this chapter is to present a brief review of the

extensive literature dealing with the relationship between education

and income levels. While most of the research reported is of United

States origin, a considerable literature from other countries is avail-

able, reflecting the intense interest that has developed internationally

in this field. There appears to be a growing appreciation, particularly

as it applies to the underdeveloped countries of the world and to dis-

advantaged regions and groups within advanced nations, of the importance

of developing human resources as a preliminary to economic advancement.

Angus Maddison, writing for the Organization for Economic Cooperation

and Development, expressed this appreciation succinctly when he stated:

> There is considerable evidence that investment in education
> has a high pay-off in terms of accelerating economic growth, and
> it is certainly true that countries which have a record of
> rapid economic development, such as Japan and the U.S.S.R.,
> have made heavy educational investments. It is, of course,
> difficult to give any quantitative weight to the role of
> education in economic growth, but there are enough studies to
> prove our general point.[1]

In the review of the literature to follow, only a brief examina-

tion of the more significant research as it applies to the problems of

this study is presented. A complete review of all the reported

research relating to the topics under consideration would be a

voluminous undertaking. Readers interested in more detailed reports on the literature are referred to the annotated bibliography of M. Blaug,[2] the Koulourianos study,[3] and the various reviews under the title, "Economics of Education," appearing periodically in the Review of Educational Research.[4]

Three principal avenues of research have been followed in the examination of the relationship between education and economic growth. These have been referred to as: the correlational approach, the residual approach, and the returns-to-investment approach. A fourth category, dealing with the objectives of national planning for manpower require-ments and termed the forecasting-manpower-needs approach, is sometimes included as a separate area of investigation. Each of these is discussed below.

II. THE SIMPLE CORRELATIONAL APPROACH

A number of studies carried out in recent decades have shown relatively high correlations between various economic indicators and several indexes of educational activity in international comparisons. These studies have found that per capita income is highly correlated with such educational measures as: the percentage of specific age groups in attendance at school,[5] the number of teachers per thousand persons in the population,[6] the percentage of national income devoted to education,[7] literacy rates,[8] and university enrolments as a percen-tage of the population.[9]

Such studies using international comparisons are beset by many

intricate difficulties, such as obtaining comparable figures for

measuring GNP and obtaining comparable measures of educational attain-

ment between countries. In addition, as Bowen has pointed out:

> It is also necessary to recognize that equal resource expendi-
> tures in two countries imply equal educational output only if
> resources are used with the same degree of efficiency in both
> countries--and we know astonishingly little about how efficiency
> is to be defined and measured, despite a recent upsurge of interest
> in the subject.[10]

Despite the difficulties encountered in such measurements, it

has become generally recognized that the level of educational attainment

of a population plays a significant role in determining the level of

economic welfare enjoyed by that population. Hence the recent interest

in the concepts of "investment in human resources," and the develop-

ment of a nation's "human capital." Hunter and McHale, in discussing

the problems of economic development in the Philippines, noted, "Any

consideration of the topic of economic development inevitably involves

the role of education."[11] John K. Galbraith has stated:

> A dollar or a rupee invested in the intellectual improvement
> of human beings will often bring a greater increase in national
> income than a dollar or a rupee devoted to railways, dams, machine
> tools or other tangible capital goods. To rescue farmers and
> workers from illiteracy may certainly be a goal in itself. But
> it is also a first indispensable step to any form of agricul-
> tural progress. Nowhere in the world is there an illiterate
> peasantry that is progressive. Nowhere is there a literate
> peasantry that is not. Education, so viewed, becomes a highly
> productive form of investment.[12]

Educational Expenditures: Consumption or Investment?

One of the vexing questions concerning such correlational studies

as those cited above is that they do not indicate the direction of the

cause and effect relationship between increasing education and increasing

wealth within nations. Kaser has emphasized that the correlational

approach tends to

> . . .Make an a priori judgement on the causation between wealth
> and learning, for the correlation is just as valid whether
> education is a consumer service, that is, if more is demanded--
> individually or socially--as aggregate income rises, or an
> investment, that is if more training induces an increase in the
> output of other goods and services.[13]

John Vaizey, after examining the increasing percentage of GNP

devoted to educational expenditures in Great Britain between 1921 and

1961--from 1.5 per cent to 4.5 per cent, declared that, "education is

evidently an aspect of increased affluence."[14] A number of studies

of the determinants of educational expenditures carried out in Canada

and the United States would tend to confirm this observation. The

research by Paterson,[15] Shapiro,[16] Curle,[17] and Miner[18] all indicated

that wealthy communities spend more on education than do communities

that are less well-to-do. Viewed in this fashion, educational expen-

ditures are a consumption item. As the wealth of a community or nation

rises, so does the amount spent on schooling.

Several researchers have attempted to determine from historical

data whether economic growth in various nations preceded or followed

increased educational efforts. Easterlin, after examining school

enrolment and per capita income data from selected countries in Europe,

North America and Oceania from 1830 tO 1954, concluded that educational

efforts, in the form of increased school enrolments, preceded economic

development in these countries.[19] Douglas C. North examined the factors

responsible for the upsurge in economic activity in the New England

area of the United States between 1815 and 1860. North concluded that

increased secondary school enrolment ratios preceding and during this period were a contributing factor in the accelerated growth experienced in this area during that time.[20]   Alexander Peaslee examined school enrolment ratios and growth data in a number of countries and arrived at a similar conclusion. He stated:

> Experience in terms of the relationship between education and economic growth suggests that the former preceded and accompanied the latter. It suggests that emphasis first on primary education has been associated with growth more than has initial emphasis on secondary and higher education.[21]

The debate about whether economic growth is a consequence of increased educational efforts within a country, or whether increased educational expenditures are a result of increasing affluence, will probably be resolved by the affirmation that both positions are correct, and that there is a circular relationship between the two. Such a position was suggested by Poignant who stated,

> In the last analysis economic growth is the driving force of educational development. . . .This is for two reasons. In the first place, a rising standard of living creates in families the psychological and material conditions needed for the further education of children; from this point of view education can be regarded as a specific form of consumption which increases as the standard of living improves; basically and subject to the provisions made above, the trend of spontaneous demand for education reflects in considerable measure improvements in economic conditions. In the second place, technological progress, while freeing men from more elementary tasks, creates a growing demand for skilled and highly trained labour and raises the standard of general and professional education required of workers generally. . . .Thus educational expansion is both a consequence of and a condition for economic progress.[22]

Educational expenditures may thus be considered to have both a consumption and an investment component.

III.   THE RESIDUAL APPROACH

Edward F. Denison is probably the best-known of the several researchers who have attempted, through the use of production functions, to determine the contribution of education to economic growth in specific countries. Denison, in his major study,[23] endeavoured to explain the growth of the United States economy during the period between 1909 and 1957 in terms of aggregate changes in labour and physical capital inputs. His analysis revealed that a substantial "residual" remained that could not be accounted for by quantitative changes in these measurable variables. In explaining this residual, Denison calculated that approximately twenty-three per cent of increases in total national productivity in the United States could be attributed to increased quality of the labour force members due to increased education, and that an additional twenty per cent of the sources of growth were due to increased technological knowledge.

Similar studies have been carried out in other countries with comparable results. Odd Aukrust examined Norway's economic growth in the 1900-1955 period with essentially similar findings.[24] Bertram made parallel estimates for Canada for the period 1911-1961. According to Bertram's calculations, "educational improvements accounted for almost one-quarter of the rise in productivity per employed person" during this period,[25] and education accounted for twelve per cent of the growth in national income between the two years.[26]

A number of criticisms have been directed at such calculations.

Critics have questioned the assumptions employed in such studies, such as the assumption that sixty per cent of observed differences in income of adult males of equal age during the time period under consideration was due to increased education while forty per cent reflected changes in other factors, and the assumption that increases in the number of hours in obtaining an education were reflected in a proportionate increase in the quality of labour.[27] However, such studies have been useful in demonstrating the inability of the traditional trinity of land, labour and physical capital to explain and account for economic progress.

IV.   THE RETURNS-TO-INVESTMENT APPROACH

A considerable volume of research on the investment value of educational expenditures is available. One set of such studies, of which those by Theodore W. Schultz are probably the most significant, have estimated aggregate returns to total costs of schooling in a nation. A second group of studies has examined the investment value to individuals of expenditures for schooling.

Aggregate Returns to Investments for Education

Schultz attempted to determine changes in the total educational "stock" in the United States during the period from 1900 to 1957, and matched this with a rate of return to obtain the contribution of education to economic growth in that country.[28] The procedure which he used was as follows: he estimated the costs of production of the total educational investment in the United States labour force for different

years. He then determined the direct and imputed costs of incremental

changes in this educational stock between time periods. His next step

involved the employment of different internal rates of return to esti-

mate the total returns to education. His final step was to divide these

returns by the absolute increase in GNP between time periods to obtain

the proportion of economic growth attributable to education. Schultz

concluded that "additional schooling in the labour force accounts for

16.5 or 20 per cent of the total growth in U.S. GNP between 1929 and

1957, depending on whether the 9 or 11 per cent rate of return is

employed."[29]

Schultz' estimates, like those of Denison, have been discussed

and criticized at length by many writers from the point of view of the

assumptions made, the procedures used, and the specific findings

obtained.[30] Few people, however, have questioned the general conclusion

of these studies, which was to the effect that improvements in the

educational level of a population, through expenditures on the schools,

have been a worthwhile national investment.

Private Returns to Expenditures for Education

One approach to the determination of the economic value of

schooling is to determine the economic gains in the form of annual

and lifetime earnings accruing to individuals who have completed

various levels of schooling. Earning differentials are calculated

from cross-sectional data, and these differentials are considered to

be gross gains attributable to increased schooling. The results of

such studies have almost uniformly demonstrated that persons with

higher educational qualifications earn more on the average both annually

and during their lifetimes than do persons who have received fewer

years of formal education. The Podoluk investigation found this

relationship to be true in Canada. This study found that average annual

earnings of Canadian male labour force members in 1961 increased from

$3,345 for persons with elementary schooling, to $4,813 for those who

had completed secondary school standing, and to $8,866 for persons with

a university degree.[31] Family income has also been found to be closely

related to the educational level of the family head. A recent National

Education Association report indicated that in the United States in

1964 the median years of schooling completed by family heads with

annual earnings under $1,000 was 8.8 years; those with earnings between

$6,000 and $6,999 was 12.1 years; while family heads with annual

earnings of $25,000 and over had a median of 15.0 years of schooling.[32]

In an extension of such studies, total or private costs of

increased schooling are equated with incremental earnings attributed

to the additional years of education to determine rates of return

from investments in education. In such estimates three factors have

to be considered: total incremental returns from increased educational

attainment, the costs of obtaining the increased amount of education,

and the discount rate employed. A large number of problems are encounter-

ed in making such calculations due to the difficulties in determining

exact values for both costs and benefits, and in selecting suitable

discount rates. Because of these difficulties, estimates of rates of

return often differ significantly from one study to another.[33]

Few attempts have been made to determine within given nations whether such education-earnings relationships are relatively constant throughout all regions or whether there are significant regional differences in this regard. Several United States studies have shown that gross differences exist between Negroes and whites in returns accruing to persons having similar levels of educational attainment,[34] and major differences between the sexes have been noted.[35] It has also been found that differences in age levels affect the education-earnings relationship. Typically, persons with few years of schooling tend to earn relatively equal annual incomes throughout their working lives, whereas the age-earning profiles of persons with considerable schooling tend to show marked differences. Such persons have relatively low annual earnings during the first years of their working careers, but earnings rise rapidly with experience on the job and continue at a high level until the end of the normal life-work span.[36]

V. THE FORECASTING-MANPOWER-NEEDS APPROACH

Much of the study of the investment value of educational efforts has been carried out in the United States with the result that economists engaged in this type of study have sometimes been referred to as The American School.[37] European economists, on the other hand, have tended to emphasize the manpower requirements approach in the study of the economics of education. Manpower forecasting has proceeded from the simple assumption that economic progress within a nation can take place

only if there is an adequate supply of well educated and highly skilled people.

Economists involved in forecasting manpower requirements in future years attempt to assess educational needs in the light of long-term targets for economic and social development, and to make specific recommendations to governments with respect to investments in education.[38] Such forecasts attempt to estimate future educational needs for facilities, staff and equipment in terms of population growth and educational services required, and to determine specific program requirements for the schools to meet national manpower needs in the future.[39]

VI. EDUCATION AND REGIONAL INCOME DISPARITIES

Canada's concern with regional income disparities is shared with many other federal systems and unitary states. Similar serious problems of economic imbalance have been found within many countries, such as the United States,[40] France,[41] and Italy,[42] as well as within specific provinces[43] and states.[44]

Several studies have attempted to assess the relative importance of specific factors, including education, in explaining differences in regional wealth, with little success. Roy L. Lassiter, in a United States investigation of the effects of education, age, race and region on income differentials, using correlational and regression analysis, found that "the correlation coefficients for the relationship between income and education were relatively low,"[45] indicating that interregional

income differences in that country were not "explained" to any great

extent by the regression of income and education. R. J. Wonnacott

found that differences in employment mix, in labour productivity,

transportation costs, capital costs, and long-run frictions preventing

labour mobility, all had important implications in income differentials

among the U.S. states and the District of Columbia.[46]

The Economic Council of Canada has undertaken several detailed

and comprehensive studies to ascertain the specific factors causing the

marked income disparities that have been found among the Canadian

provinces. In one of these studies, Denton sought to determine whether

differences in age distributions and educational levels were respon-

sible for the interregional differences in average earnings. His

conclusion was that:

> There is no doubt that there are substantial differences among
> the regions with respect to the average educational levels of the
> population and labour force. These differences account for part
> of the variation in earnings, but only a small part. Most of the
> variations still remain to be accounted for.[47]

The general conclusion of such economic studies of the causes

of regional income disparities is that many factors in addition to

differences in educational attainment of the populations concerned are

responsible for these disparities. Economic growth and the accompanying

increasing incomes that are associated with it are apparently the

result of a very complex set of factors. Attempts to delineate all of

the possible sources of economic growth tend to lead to what has been

referred to as a "smorgasbord of possibly relevant factors."[48]

This tendency of efforts to pinpoint the specific causes of

regional income disparities to lead into a veritable maze of possible factors seems to be entirely unsatisfactory, and leads one to wonder whether there may not be one, or a very few, key factors that are responsible.[49] The recent research stressing the significant role which education plays in national economic growth suggests that such a possible key factor may be related to the educational levels of the populations concerned.

VII. SUMMARY

A very large amount of research in the field of economics of education has been carried out throughout the world. This research has indicated that the educational level of individuals and national groups plays a significant role in determining the level of economic welfare of people. The studies by Denison and Schultz have demonstrated the importance of an educated population in increasing national economic growth and productivity, and the "universal association"[50] between individual earnings and educational levels indicates the importance of schooling in terms of the economic welfare of individuals.

In assessing the role of education in promoting economic advancement, Mark Blaug has concluded:

> The really disputable issue is not so much whether education is one of the sources of growth, but whether it is a more significant source than physical capital or other types of social expenditure.[51]

Research efforts to explain regional differences in income and economic growth in relation to differences in the educational levels of

regional populations have not led to the results that would be anti-

cipated from the results of other research in the area.

The present study that follows represents an attempt, through

a detailed examination of available data, to determine the relationship

between Canadian provincial income disparities and provincial educa-

tional levels.

FOOTNOTES FOR CHAPTER II

[1]Angus Maddison, "Growth Problems in Underdeveloped Countries," in Herbert S. Parnes (ed.), _Planning Education for Economic and Social Development_ (Paris: Organization for Economic Cooperation and Development, 1962), p. 25.

[2]M. Blaug, _The Economics of Education: A Selected Annotated Bibliography_ (Oxford: The Pergammon Press, 1966).

[3]Dmitri Th. Koulourianos, _Educational Planning for Economic Growth_ (Technical Report No. 23, Center for Research in Management Science, University of California, Berkeley, California, February, 1967).

[4]Cf. Charles S. Benson, "Economics and Education," _Review of Educational Research_, XXXVI:1 (February, 1967), pp. 96-102.

[5]Alexander L. Peaslee, "Primary School Enrolments and Economic Growth," _Comparative Education Review_, XI (February, 1967), pp. 57-67; Frederich Harbison and Charles A. Myers, _Education, Manpower and Economic Growth_ (New York: McGraw-Hill Book Company, 1964).

[6]A. Curle, "Education, Politics and Development," _Comparative Education Review_, VII:3 (1963), pp. 226-45.

[7]Friedrich Edding, _International Trends in Educational Expenditures_ (Kiel: Kiel University Press, 1958).

[8]Bruce M. Russett, _et al._, _World Handbook of Social and Political Indicators_ (New Haven: Yale University Press, 1964).

[9]_Ibid_.

[10]William G. Bowen, _Economic Aspects of Education_ (Princeton, N.J.: Industrial Relations Section, Department of Economics, Princeton University Press, 1964), p. 63.

[11]Chester L. Hunter and Thomas R. McHale, "Education and Philippine Economic Development," _Comparative Education Review_, IX (February, 1965), p. 63.

[12]John K. Galbraith, _Economic Development in Perspective_ (Cambridge: Harvard University Press, 1963), p. 49.

[13]M. C. Kaser, "Education and Economic Progress: Experience in Industrialized Market Economies," in E. A. G. Robinson and J. E. Vaizey (eds.), _The Economics of Education_ (London: MacMillan, 1966), p. 89.

[14]John Vaizey, The Control of Education (London: Faber and Faber, 1963), p. 13.

[14]Ian W. Paterson, "An Analysis of Determinants of Education Expenditures Among the Provinces of Canada Decennially, 1941-61" (unpublished doctoral dissertation, The University of Alberta, Edmonton, 1967).

[16]S. Shapiro, "An Analysis of Current Public and Societal Expenditures per Pupil in Elementary and Secondary Schools" (unpublished doctoral dissertation, University of Chicago, 1962).

[17]Curle, op. cit.

[18]Jerry Miner, Social and Economic Factors in Spending for Public Education (Syracuse, N.Y.: Syracuse University Press, 1963).

[19]Richard A. Easterlin, "A Note on the Evidence of History," in C. Arnold Anderson and Mary Jean Bowman (eds.), Education and Economic Development (Chicago: Aldine Publishing Company, 1963), pp. 422-29.

[20]Douglas C. North, Growth and Welfare in the American Past: A New Economic History (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1966), pp. 84-85.

[21]Peaslee, op. cit., p. 66.

[22]Raymond Poignant, "Establishing Educational Targets in France," in Herbert S. Parnes (ed.), Planning Education for Economic and Social Development (Paris: Organization for Economic Cooperation and Development, 1962), p. 208.

[23]Edward F. Denison, The Sources of Economic Growth and the Alternatives Before Us (New York: Committee on Economic Development, 1962).

[24]Odd Aukrust, "Investment and Economic Growth," Productivity Management Review (February, 1959), pp. 35-53.

[25]Gordon W. Bertram, The Contribution of Education to Economic Growth (Ottawa: The Economic Council of Canada, Staff Study No. 12, June, 1966), p. 55.

[26]Ibid., p. 56.

[27]Bruce M. Wilkinson, Studies in the Economics of Education (Ottawa: Economics and Research Branch, Department of Labour, July, 1965), pp. 26-27.

[28]Theodore W. Schultz, _The Economic Value of Education_ (New York: Columbia University Press, 1963).

[29]_Ibid._, pp. 45-46.

[30]Mary Jean Bowman, "Schultz, Denison and the Contributions of 'Eds' to National Income Growth," _Journal of Political Economy_, LXXII (October, 1964), pp. 450-64; Koulourianos, op. cit., pp. 62-78.

[31]J. R. Podoluk, _Education and Earnings_ (Ottawa: Dominion Bureau of Statistics, December, 1965), p. 21.

[32]National Education Association, _Financial Status of the Public Schools_ (Washington, D.C.: Committee on Education Finance, The Association, 1966), p. 18.

[33]Koulourianos, _op. cit._, p. 77.

[34]Roy L. Lassiter, Jr., "The Association of Income and Education for Males, by Region, Race and Age," _Southern Economic Journal_, XXXII:1 (July, 1965), pp. 15-22.

[35]Podoluk, _op. cit._, pp. 22-29.

[36]Gary S. Becker, _Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education_ (New York: National Bureau of Economic Research, Columbia University Press, 1964), p. 15; also, Jacob Mincer, "Investment in Human Capital and Personal Income Distribution," _Journal of Political Economy_, LXVI:4 (August, 1958), pp. 281-302.

[37]Koulourianos, _op. cit._, p. 78.

[38]Alexander King, in the Foreword to: Herbert S. Parnes (ed.), _Forecasting Educational Needs for Economic and Social Development_ (Paris: Organization for Economic Cooperation and Development, 1962), p. 3.

[39]Wilkinson, _op. cit._, p. 33.

[40]Mary Jean Bowman, "Human Inequalities and Southern Economic Development," _Southern Economic Journal_, XXXII:1, Pt. 2 Supplement (July, 1966), pp. 73-102.

[41]Niles M. Hansen, "Human Resources and Regional Development: Some Lessons from French Experience," _Southern Economic Journal_, XXXIV:1 (July, 1967), pp. 123-32.

[42]Bhagwant Singh, "Italian Experience in Regional Economic Development and Lessons for Other Countries," Economic Development and Cultural Change, XV:3 (April, 1967), pp. 315-22.

[43]John F. Graham, Fiscal Adjustment and Economic Development: A Case Study of Nova Scotia (Toronto: University of Toronto Press, 1963); and P. Cama, E. P. Weeks, and Z. W. Sametz, Economic Geography of Canada (Toronto: MacMillan, 1964), Chapter 10.

[44]Mary Jean Bowman and W. Warren Haynes, Resources and People of East Kentucky (Baltimore: The John Hopkins Press, 1963).

[45]Lassiter, op. cit., p. 18.

[46]R. J. Wonnacott, "Wage Levels and Employment Structure in United States Regions: A Free Trade Precedent," Journal of Political Economy, LXXII:4 (August, 1964), pp. 414-19.

[47]Frank T. Denton, An Analysis of Interregional Differences in Manpower Utilization and Earnings (Staff Study No. 15; Ottawa: The Economic Council of Canada, April, 1966), p. 11.

[48]Economic Council of Canada, Towards Sustained and Balanced Economic Growth (Second Annual Review, Ottawa: The Queen's Printer, 1965), p. 66.

[49]One group of researchers have attempted to explain differences in economic advancement among nations in terms of psychological forces. McClelland, for example, found that differences in achievement motivation among population groups correlated highly with indexes of economic progress. Vide: David C. McClelland, The Achieving Society (New York: D. Van Nostrand Company, 1961).

[50]Term used in: M. Blaug, "An Economic Interpretation of the Private Demand for Education," Economica, XXXIII (May, 1966), p. 181.

[51]M. Blaug, "The Rate of Return on Investment in Education in Great Britain," The Manchester School of Economic and Social Studies, XXXIII (September, 1965), p. 232.

CHAPTER III

POPULATION EDUCATIONAL LEVELS

Canada, like many other countries, has been concerned for many
years with the problem of disparities in wealth among the several regions
of the country. We have seen in the previous chapter that a strong
relationship has been found to obtain between the educational level of
populations and the relative economic wealth enjoyed by these popula-
tions. In this chapter, differences in average levels of educational
attainment of the adult populations of the Canadian provinces will be
examined in detail. If the education-earnings relationship does in
fact hold true in Canada, it would be expected that one of the factors
that may be responsible for interprovincial income discrepancies is
found in differences in the educational levels of provincial popula-
tions.

Before examining these interprovincial differences, a brief
examination of the educational level of the total Canadian adult
population will be made.

I. METHODS OF COMPARING EDUCATIONAL LEVELS OF POPULATIONS

There are several possible methods of obtaining estimates of the
average educational attainment of populations from which comparisons
may be made. One method is to present a grid showing the distribution
of a total population among several educational level categories, by

using either the actual numbers of persons in the several classifica-

tions, or by employing percentage distributions.

Other estimates of average levels of educational attainment of

populations that have been found useful are means and medians. The use

of a mean measure of educational attainment of a population requires the

assumption of a linear progression of educational attainment from zero

years for persons with no schooling to the maximum number of years of

schooling shown in census tabulations. Where population distributions

in census tabulations are given in broad educational level categories,

for example, from five to eight years of elementary schooling, discrete

values representing the average level of education for all persons with-

in such broad classifications must be assumed. The particular assump-

tions used, and the method employed in determining mean educational

levels of the Canadian and provincial populations are presented in the

Appendix.

When a median estimate of the average educational attainment of a

population is determined, an attempt is made to ascertain that particular

level of schooling   which divides the population distribution into two

equal parts. The median is the point which divides the population in

such a way that exactly one-half has received more schooling, and the

other half has received less, than the median amount. It is assumed,

when a median measure is calculated, that the number of persons having

a specific level of schooling, say seven years, is evenly distributed

through the interval from 7.0 to 7.9 years. The assumptions used and

the method employed in estimating median years of educational attainment

in this study are presented in the Appendix.

In this study, the methods employed to show population educational levels are total and percentage distributions, means and medians.

II. THE AVERAGE EDUCATIONAL LEVEL OF THE CANADIAN ADULT POPULATION

The distributions of the Canadian male and female populations aged ten years and over not attending school, classified in five-year age groups and eight classifications of educational attainment, are presented in the 1961 Census of Canada.[1] From this table the percentage distribution of the total adult population of normal working age may be calculated, and an indication of the gradual increase in the level of schooling of the work force may be obtained.

Table I presents the total and percentage distributions in 1961 of both the male and female populations of Canada aged twenty to sixty-four in eight educational level classifications.[2] A number of very important conclusions may be drawn from the figures in this table. A larger proportion of males than females, 8.3 per cent as against 5.2 per cent, attained university level education, although the number of males with some university or with university degrees is a relatively small proportion of the total population of working age males. Also, a larger number of males had only elementary school education as compared to the female population. More females had from three to five years of secondary schooling: 31.1 per cent for females compared to 23.4 per cent for males.

When mean and median levels of schooling of the male and female

TABLE I

DISTRIBUTION OF THE MALE AND FEMALE POPULATIONS OF CANADA
AGED 20-64 BY LEVEL OF SCHOOLING, 1961

	No Schooling	Elementary		Secondary			University		Total
		1-4	5-8	1-2	3	4-5	Some	Degree	
MALE									
Number	52,633	334,203	1,736,278	980,638	384,681	675,791	165,618	213,429	4,543,271
Per cent	1.2	7.4	38.2	21.6	8.5	14.9	3.6	4.7	100.0
FEMALE									
Number	50,659	259,009	1,537,690	1,035,620	496,408	909,274	144,646	88,285	4,521,594
Per cent	1.1	5.7	34.0	22.9	11.0	20.1	3.2	2.0	100.0

Source: 1961 Census of Canada, Bulletin 1:3-6, Table 102.

populations of Canada between the ages of twenty and sixty-four in 1961 are calculated, as in Table II, a slight superiority in favour of the females is obtained.

TABLE II

MEAN AND MEDIAN LEVELS OF EDUCATIONAL ATTAINMENT OF THE
CANADIAN MALE AND FEMALE POPULATIONS
AGED 20-64, 1961

	Mean Years	Median Years
Male	9.10	9.30
Female	9.27	9.80

Source: Table I. For method of determining mean and median, vide the Appendix.

An indication of the gradual but steady increase in the level of educational attainment of adult Canadians is provided when the distributions of the adult populations are broken down into age categories to separate out those who received their schooling in recent years from persons whose formal education occurred in earlier decades. Such a distribution is presented in Table III. This table presents the percentage distribution of the male and female populations of Canada aged twenty and over in 1961 in five age groups, classified by eight levels of educational attainment.

The trend towards increased schooling of the Canadian population is clearly evident from the tabulations in Table III. With increasing age levels, the percentage of persons with no schooling and with only

TABLE III

PERCENTAGE DISTRIBUTION OF CANADIAN MALES AND FEMALES TWENTY YEARS
OF AGE AND OVER IN FIVE AGE GROUPS CLASSIFIED BY
YEARS OF SCHOOLING, 1961

| Age | None | Elementary | | Secondary | | | University | |
		1-4	5-8	1-2	3	4-5	Some	Degree
				Males				
20-24	0.7	3.0	31.6	27.7	11.4	20.1	3.9	1.6
25-34	0.8	4.1	34.9	24.0	9.6	17.1	4.1	5.5
35-44	0.9	6.4	37.0	21.9	9.1	15.0	3.9	5.9
45-64	1.8	12.0	43.8	17.6	6.2	11.4	3.0	4.3
65+	5.4	20.2	46.6	12.0	3.4	7.6	2.2	2.7
				Females				
20-24	0.6	2.2	24.2	26.7	13.8	27.3	3.7	1.4
25-34	0.7	3.3	30.2	24.9	12.4	22.7	3.5	2.3
35-44	0.8	5.2	34.2	22.9	11.4	20.5	3.1	2.0
45-64	1.9	9.3	40.5	30.0	8.5	15.1	2.8	1.9
65+	4.3	13.9	46.8	15.5	5.3	11.4	2.0	0.9

Source: 1961 Census of Canada, Bulletin 1:3-6, Table 102.

elementary schooling increases, while the percentage of persons having

secondary schooling or university education decreases. There are minor

exceptions to this trend, both in the male and female classifications,

in the percentages of persons in the younger age groups having univer-

sity level education. The lower-than-expected figures for the 20-24

age classifications are probably explained by the fact that a

number of persons of this age were still enrolled in university when

the census figures were tabulated. As noted below (vide Table XII, page

63), 8.0 per cent of the Canadian population aged 20-24 was "enrolled in

school" in 1961, and many of these would be awarded university degrees

in later years. While no similar figures are available for the 25-34

year olds, the trend in Table III would suggest that a smaller but significant number of males in this age category would be enrolled in university as well.

The mean and median levels of educational attainment of these same age groups are presented in Table IV. The gradual but steady increase in the amount of schooling attained by both male and female Canadians of decreasing age is clearly evident in this tabulation. The superiority of the Canadian female population in both the mean and median measures of educational attainment in all age categories is also apparent.

TABLE IV

ESTIMATED MEAN AND MEDIAN YEARS OF EDUCATIONAL ATTAINMENT OF THE
MALE AND FEMALE POPULATIONS TWENTY YEARS AND OVER CLASSIFIED
IN FIVE AGE GROUPS, CANADA – 1961

| Age group | Male | | Female | |
	Mean	Median	Mean	Median
20-24	9.54	10.06	10.01	10.72
25-34	9.59	9.85	9.70	10.27
35-44	9.34	9.52	9.36	9.86
45-64	8.43	8.26	8.61	8.83
65+	7.21	7.09	7.69	7.72

Source: Table III, page 44.

III.   EDUCATIONAL LEVELS OF CANADIAN PROVINCIAL POPULATIONS

In this section, average levels of educational attainment of the adult male and female populations of each of the Canadian provinces are presented and interprovincial comparisons are made.

Educational Levels of Provincial Male Adults

The 1961 distribution in each province of males not attending school classified by eight levels of educational attainment and several age groups are presented in the 1961 Census of Canada.[3] From these tabulations, the percentage distributions, means and medians of the male provincial populations making up the major portion of the provincial labour force membership are calculated.

In Table V, the percentage distribution of the male populations of the Canadian provinces aged 20-64 years in eight educational level clsssifications are presented. The figures shown are those for 1961.

An examination of Table V shows that there were very marked differences in the level of schooling of the male populations of the Canadian provinces in 1961. The percentage of persons with no schooling varied from a high of 5.7 in Newfoundland to 0.8 for both Ontario and Quebec, and the percentage of males with from one to four years of elementary schooling ranged from 3.9 in British Columbia to 22.5 in Newfoundland. The proportion with university degrees varied from 5.8 per cent in Ontario to 1.5 per cent in Newfoundland.

When educational classifications are combined, it is possible to roughly rank order the provinces by the percentage of persons with

TABLE V

PERCENTAGE DISTRIBUTION OF THE MALE POPULATION OF THE CANADIAN PROVINCES
AGED 20-64 BY LEVEL OF SCHOOLING, 1961

Province	No Schooling	Elementary		Secondary			University	
		1-4	5-8	1-2	3	4-5	Some	Degree
Newfoundland	5.7	22.5	35.2	18.5	9.7	4.4	2.4	1.5
Prince Edward Island	1.1	7.6	47.3	26.6	5.2	6.3	3.1	2.8
Nova Scotia	1.4	7.4	37.7	28.3	10.6	7.6	3.2	3.8
New Brunswick	3.0	12.7	46.0	17.6	8.2	6.1	3.0	3.4
Quebec	0.8	12.8	41.9	17.8	5.4	12.5	3.5	5.3
Ontario	0.8	4.7	39.7	20.5	8.4	16.7	3.4	5.8
Manitoba	1.7	7.6	35.4	23.3	12.5	11.0	4.2	4.3
Saskatchewan	2.0	7.2	43.5	21.9	8.1	10.8	3.0	3.4
Alberta	1.3	5.2	35.8	24.3	9.8	14.9	3.6	5.2
British Columbia	1.0	3.9	30.0	24.5	9.7	20.3	5.3	5.4

Source: 1961 Census of Canada, Bulletin 1:3-6, Table 103.

given levels of schooling. For example, when the percentage of males with more than elementary schooling are calculated, the following provincial ordering for 1961 is obtained, with percentages shown:

1. British Columbia - 65.1%   6. Saskatchewan - 47.3%
2. Alberta - 57.8%   7. Quebec - 44.5%
3. Manitoba - 55.3%   8. Prince Edward Island - 44.0%
4. Ontario - 54.8%   9. New Brunswick - 38.2%
5. Nova Scotia - 53.5%   10. Newfoundland - 36.6%

When the percentage of persons with more than two years of secondary education are obtained, the rank ordering is altered as follows:

1. British Columbia - 40.7%   6. Saskatchewan - 25.3%
2. Ontario - 34.3%   7. Nova Scotia - 25.2%
3. Alberta - 33.5%   8. New Brunswick - 20.7%
4. Manitoba - 33.0%   9. Newfoundland - 18.0%
5. Quebec - 26.7%   10. Prince Edward Island - 17.4%

When mean and median levels of educational attainment are calculated, the variations in provincial educational levels are again evident. These values for males aged 20-64 years are presented in Table VI.

It is interesting to compare these figures with those calculated by Gordon W. Bertram, who estimated that Canadian labour force males in 1961 were about two years behind their American counterparts in median years of schooling.[4] Bertram's figures indicated that the median level of schooling of United States males aged twenty-five and over was 10.30 in 1960,[5] a figure that is equal to the calculated median value for

TABLE VI

MEAN AND MEDIAN LEVELS OF EDUCATIONAL ATTAINMENT OF THE MALE
POPULATION AGED 20-64 IN THE CANADIAN PROVINCES, 1961

Province	Mean	Median
Newfoundland	7.2	7.5
Prince Edward Island	8.4	8.5
Nova Scotia	8.8	9.2
New Brunswick	8.0	8.0
Quebec	8.6	8.5
Ontario	9.4	9.5
Manitoba	9.0	9.5
Saskatchewan	8.6	8.7
Alberta	9.3	9.6
British Columbia	9.8	10.3

Source: Table V, page 47.

British Columbian males in Table VI. Thus it could be concluded that the educational level of the average male adult in British Columbia in 1961 was approximately equal to that of the average United States male adult in 1960, and that the discrepancies between the United States and Canadian provincial populations were approximately as follows in 1961: Ontario, Manitoba and Alberta were about one year behind the United States average; Nova Scotia and Saskatchewan, one-and-one-half years behind; Quebec and Prince Edward Island, almost two years behind; New Brunswick, two-and-one-half years behind; and Newfoundland almost three years behind the United States average in schooling.

Education-age classifications. Tabulations of the educational levels of the adult male populations of the Canadian provinces provide an indication of changes in the level of schooling of these populations over the years. The 1961 census provides such tabulations in five age classifications. This makes it possible to compare provinces in the number of persons of different ages who have attained various levels of schooling. Calculations of mean and median levels of educational attainment for these age groups in each province also provide figures from which interprovincial comparisons may be made and trends noted. Table VII presents for each province the mean and median levels of schooling of the 1961 male populations aged twenty and over in five age classifications.

An examination of the data in Table VII suggests that the educational levels of the populations in all provinces are increasing

TABLE VII

MEAN AND MEDIAN LEVELS OF EDUCATION OF CANADIAN PROVINCIAL
ADULT MALES CLASSIFIED BY AGE, 1961

Province	Age 20-24		Age 25-34		Age 35-44		Age 45-64		Age 65+	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Newfoundland	9.0	9.7	8.2	8.7	7.2	7.4	6.5	6.4	4.7	3.0
Prince Edward Island	9.1	9.9	8.8	9.1	8.6	8.8	8.0	8.0	7.5	7.5
Nova Scotia	9.4	9.9	9.3	9.7	9.1	9.5	8.3	8.6	7.2	7.3
New Brunswick	9.0	9.3	8.7	8.8	8.2	8.1	7.4	7.4	6.4	6.5
Quebec	9.0	9.2	9.2	9.2	8.8	8.6	8.1	7.8	6.7	6.3
Ontario	9.8	10.3	9.8	10.1	9.7	9.9	8.8	8.6	7.5	7.3
Manitoba	9.9	10.5	9.8	10.2	9.4	9.8	8.3	8.5	7.0	7.1
Saskatchewan	9.7	10.2	9.5	9.9	9.1	9.3	7.8	7.7	6.7	6.8
Alberta	10.0	10.7	10.0	10.4	9.8	10.0	8.4	8.4	7.3	7.4
British Columbia	10.4	11.2	10.3	10.8	10.2	10.6	9.2	9.5	8.2	8.2

Source: 1961 Census of Canada, Bulletin 1:3-6, Table 103.

relatively steadily, because of the greater educational attainments of the younger members of working age, although the rates of increase appear to differ appreciably among provinces. The absolute change in the mean and median educational levels between persons aged sixty-five and over, and the 20-24 age group is greatest for Newfoundland and least for Prince Edward Island. A trend toward a geographic ordering of mean and median levels of schooling is also evident among both the 20-24 and the 25-34 age groups, where the five western provinces are clearly ahead of the five eastern provinces. No such regional ordering is apparent among the three older age groups.

Table VII indicates a remarkable increase in the median level of schooling of the male population of the Province of Newfoundland during recent decades. For the 65 and over age group, the median years of schooling of Newfoundland males in 1961 was 3.0 years; the corresponding value for the 20-24 age group was 9.7 years.

For the other nine provinces, changes between the older and younger age groups shown in Table VII were much more modest. It is also noteworthy that the range in the median levels of schooling in each age classification for these nine provinces is not decreasing to any significant degree. The range in medians for the sixty-five and over group is from 6.3 years for Quebec to 8.2 years for British Columbia, a difference of 1.9 years. For the 45-64 age classification, the corresponding difference is 1.9 years; for the 35-44 age classification it is 2.0 years, while the range in medians for the 20-24 age classification is 2.0 years.

Hence, while there has been a reshuffling in the ordering of the provinces into a situation where the five western provinces are ahead of the five eastern provinces in terms of population educational levels, the educational level gap among the provinces, exclusive of Newfoundland, does not appear to be narrowing.

A further indication of changes in educational levels of provincial populations is given by comparing educational data from the 1951 and 1961 Census of Canada tabulations. Because of differences in the information sought during these two census years,[6] such comparisons may not be too valid. Despite the problem of comparability between the successive census data, it is useful to compare provincial means and medians in educational attainment for the 1951 and 1961 male adult populations.

The mean and median levels of schooling of the male populations aged twenty to sixty-four years in the ten Canadian provinces in 1951 are presented in Table VIII. A comparison between medians from Table VIII and those for 1961 presented in Table VI, page 49, shows increases in all provinces, but rather large differences in the amount of change. During the ten-year period the provincial increases in median years of schooling of the adult males in this age classification were as follows:

Newfoundland - 0.7 years   Ontario - 0.5 years

Prince Edward Island - 0.3 years   Manitoba - 0.9 years

Nova Scotia - 0.6 years   Saskatchewan - 0.6 years

New Brunswick - 0.4 years   Alberta - 0.7 years

Quebec - 0.5 years   British Columbia - 0.7 years

TABLE VIII

MEAN AND MEDIAN YEARS OF EDUCATIONAL ATTAINMENT OF THE
MALE POPULATION AGED 20-64 IN CANADA AND THE
PROVINCES, 1951

Province	Mean	Median
Newfoundland	6.7	6.8
Prince Edward Island	8.3	8.2
Nova Scotia	8.5	8.6
New Brunswick	7.6	7.6
Quebec	8.3	8.0
Ontario	9.1	9.0
Manitoba	8.4	8.6
Saskatchewan	8.1	8.1
Alberta	8.7	8.9
British Columbia	9.2	9.6
Canada	8.6	8.5

Source: 1951 _Census of Canada_, Volume II, Tables 27 and 28.

Educational Levels of Provincial Female Adults

During recent decades Canadian women have become increasingly involved in the economic activities of the nation.[7] Because of this, consideration must be given to the contribution of the female labour force membership to national and regional economic life.

The Podoluk study demonstrated that average earnings of Canadian female employees were substantially below those for males,[8] but also suggested that education tended to have an equalizing effect, in the sense that earning differentials of females _vis-a-vis_ male work force members tended to be greater for those with little education and less for those with higher educational attainments.[9] In 1961, the ratio of average annual earnings of Canadian female wage and salary earners having elementary schooling to average annual earnings of males having similar schooling was reported by Podoluk to be 0.49. The corresponding ratios for those with secondary schooling and with university degrees were 0.54 and 0.58.[10] Increased educational attainment on the part of Canadian women thus appears to be an important factor in the case of those who seek employment. Differences among the provinces in educational attainments of females may also, as with the male population, have differential effects on average provincial income levels.

The percentage distributions of provincial female populations aged twenty to sixty-four in 1961, classified into eight levels of educational attainment, are presented in Table IX. This table suggests that there are rather large differences among the provinces in the level of schooling of adult females. For example, the percentage having

TABLE IX

PERCENTAGE DISTRIBUTION OF THE FEMALE POPULATION AGED 20-64 BY LEVEL OF SCHOOLING,
CANADA AND THE PROVINCES, 1961

Province	No Schooling	Elementary		Secondary			University	
		1-4	5-8	1-2	3	4-5	Some	Degree
Newfoundland	3.3	14.9	33.8	24.2	14.4	6.1	2.8	0.5
Prince Edward Island	0.6	3.5	30.9	35.4	11.3	14.0	3.5	0.8
Nova Scotia	0.8	3.7	29.1	30.7	18.5	13.3	3.1	1.8
New Brunswick	1.5	7.3	38.9	21.4	13.6	13.0	3.1	1.1
Quebec	0.7	9.1	42.7	20.4	6.9	16.0	2.4	1.8
Ontario	0.8	3.7	32.7	23.2	11.1	23.5	2.7	2.2
Manitoba	1.9	6.0	28.3	24.1	17.4	16.8	3.6	1.9
Saskatchewan	2.2	5.4	33.0	22.1	12.0	20.0	3.9	1.4
Alberta	1.5	3.9	26.8	25.0	13.6	21.9	5.2	2.1
British Columbia	1.2	2.9	22.1	24.5	12.6	28.9	5.5	2.4
Canada	1.1	5.7	34.0	22.9	11.0	20.1	3.2	2.0

Source: 1961 Census of Canada, Bulletin 1:3-6, Table 103.

one to four years of elementary education varied from 2.9 in British

Columbia to 14.9 in Newfoundland, while the percentage having univer-

sity degrees ranged from 0.5 in Newfoundland to 2.4 in British Columbia.

It was noted above that females who have higher levels of

education tend to have more equal earnings compared to similarly educated

Canadian males than do those with less education. Thus the economic

contribution of female work force members will tend to be greater in

provinces having larger proportions of well-educated persons. When the

percentages from the last three columns of Table IX are combined, the

following ordering of the provinces obtains, with the percentage of

females having more than three years of secondary schooling shown:

1. British Columbia - 36.8%   6. Quebec - 20.2%

2. Alberta - 29.2%   7. Prince Edward Island - 18.3%

3. Ontario - 28.4%   8. Nova Scotia - 18.2%

4. Saskatchewan - 25.3%   9. New Brunswick - 17.2%

5. Manitoba - 22.3%   10. Newfoundland - 9.4%

Female adults in the five western provinces appear in this

measure to have very definite economic advantages as compared with

their counterparts in the other Canadian provinces.

Mean and median levels of schooling of provincial adult females

aged twenty to sixty-four are presented in Table X. When medians from

this table are compared, it is noted that they vary from 8.8 years of

schooling for both Newfoundland and Quebec to 10.9 years in the case of

British Columbia, a difference of 2.1 years. Again, the five western

provinces appear to be somewhat higher in median years of schooling,

TABLE X

MEAN AND MEDIAN LEVELS OF EDUCATIONAL ATTAINMENT OF THE FEMALE
POPULATION AGED 20-64 IN THE CANADIAN PROVINCES, 1961

Province	Mean	Median
Newfoundland	7.3	8.8
Prince Edward Island	9.3	9.8
Nova Scotia	9.5	9.7
New Brunswick	8.8	9.2
Quebec	8.7	8.8
Ontario	9.5	10.1
Manitoba	9.3	10.1
Saskatchewan	9.2	9.9
Alberta	9.7	10.4
British Columbia	10.2	10.9
Canada	9.3	9.8

Source: Table IX, page 56.

although this advantage is not evident in the mean measure shown in Table X.

When values from Table X, relating to provincial adult female populations, are compared with the corresponding values for males in Table VI, page 49, it would appear that educational level differences among the provinces are greater for males than for females. The inter-provincial range in medians for adult males in 1961 was from 7.5 years to 10.3 years, a difference of 2.8 years of schooling, while the corresponding difference in medians for females was 2.1 years.

IV.   INTERPROVINCIAL COMPARISONS OF PUPIL RETENTION RATES

An examination of school attendance figures and data concerning pupil retention of Canadian provincial school systems provides an indication as to whether or not the trends noted in the above sections are likely to continue into the future. If it is assumed that the bulk of the work force membership in each province is recruited from the graduates of its own educational system, then such prognostications are valid.[11]

A study by John E. Cheal using data available to 1961 examined Canadian provincial school system retention rates as a measure of educational output.[12] Three measures of pupil retention were employed in this study: an age-cohort measure, in which estimates of the percentage of pupils enrolled in Grade II during the 1948-49 school year were retained in school to Grades XI and XII in 1956-57 and 1957-58; the number of pupils enrolled in secondary grades as a

percentage of total school enrolment in each province; and the percentage of the 15-19 age group enrolled in school. On the basis of these three measures of pupil retention, Cheal concluded in 1963 that the provinces could be ranked in output as follows:

1. British Columbia
2. Alberta
3. Saskatchewan
4. Ontario
5. Manitoba
6. Nova Scotia
7. New Brunswick
8. Prince Edward Island
9. Newfoundland
10. Quebec[13]

More recent figures on retention rates of provincial school systems are available. Dominion Bureau of Statistics tabulations for the 1964-65 school year,[14] based upon school enrolment data in the provinces, are provided in Table XI. These figures are estimates of the numbers of male and female students enrolled in Grade XI during the 1964-65 school year as percentages of their age-cohort group enrolled in Grade II during the 1952-53 school term. It will be noted in Table XI that two sets of figures are supplied for the Province of Quebec, one applying to the Roman Catholic school system in that province, and the other to the Protestant schools. Rank ordering of the eleven school systems, for both boys and girls, is also shown in this table.

The rank ordering in Table IX places Protestant Quebec slightly ahead of Ontario in the retention rate of boys; otherwise the general trend of the five western provinces having higher retention rates than the five eastern provinces, in the case of both boys and girls, is clearly evident.

TABLE XI

ESTIMATED RETENTION RATES OF PROVINCIAL SCHOOL SYSTEMS
(EXPERIENCE OF A COHORT FROM 1952-53 TO 1964-65)

Province	Boys		Girls	
	Per cent	Rank	Per cent	Rank
Newfoundland	43	9	40	10
Prince Edward Island	38	10.5	43	9
Nova Scotia	46	8	60	6
New Brunswick	50	7	57	8
Quebec - Roman Catholic	38	10.5	37	11
- Protestant	54	5	58	7
Ontario	52	6	62	5
Manitoba	72	4	71	4
Saskatchewan	74	3	81	2
Alberta	80	1	82	1
British Columbia	78	2	79	3

Source: Dominion Bureau of Statistics, Student Progress Through the Schools by Age and Grade, 1965 (Ottawa: The Queen's Printer, February, 1966), Table 3.

Table XII presents 1961 school enrolment data for the provincial populations in the age classifications 15-19 and 20-24 years by percentage and rank order. The figures in Table XII show that the percentages of persons of both secondary school age and university age varied significantly among provinces in 1961. In Quebec slightly more than one-half the population between the ages of 15 and 19 years was in attendance at school, while in British Columbia over two-thirds of this age group was enrolled. The enrolment ratios of the twenty to twenty-four year olds varied from 3.9 per cent in Newfoundland to 9.5 per cent in British Columbia.

Rank ordering the provinces by school retention rates, as shown in Table XII, indicates that the regional trend noted previously is likely to continue. The five western provinces had substantially higher retention rates for both age classifications shown in this table. These figures suggest that the labour force populations of the five western provinces are likely to be augmented in substantially greater numbers with persons having higher educational qualifications than will be the case in Quebec and the four Maritime provinces.

V. SUMMARY

The average educational level of the Canadian population has been increasing gradually but steadily over the years. In 1951 the median level of schooling of Canadian adult males aged 20-64 was 8.5 years; in 1961 this value had increased to 9.3 years.

Although fewer women than men have university education, Canadian

TABLE XII

INTERPROVINCIAL COMPARISONS OF PUPIL RETENTION, 1961

| Province | Population of various ages attending school | | | |
| | Age 15-19 | | Age 20-24 | |
	Per cent	Rank	Per cent	Rank
Newfoundland	51.7	9	3.9	10
Prince Edward Island	55.5	8	6.5	8
Nova Scotia	57.3	6	5.9	9
New Brunswick	56.7	7	6.7	7
Quebec	50.1	10	7.4	6
Ontario	62.9	4	8.8	2
Manitoba	62.1	5	8.0	3
Saskatchewan	65.5	3	7.8	5
Alberta	65.8	2	7.9	4
British Columbia	68.0	1	9.5	1
Canada	58.5	--	8.0	--

Source: 1961 Census of Canada, "Schooling by Age Groups," Volume 1, Part 3, No. 6.

females tend to have higher average levels of schooling than males. A larger proportion of females have three or more years of secondary education, while the proportion with only elementary schooling is substantially less. In 1961 the median years of schooling of females aged 20-64 was 9.8 years, compared with 9.3 years for males of similar age.

Substantial differences were found in educational attainments of provincial adult populations. In 1961 the range in median years of schooling of males aged 20-64 was from 7.5 years for Newfoundland to 10.3 for British Columbia, a difference of 2.8 years. The variations among provinces for adult females was somewhat less than for males: from 8.8 years in Quebec and Newfoundland to 10.9 for British Columbia, a difference of 2.1 years.

While the average level of schooling in all the provinces increased between 1951 and 1961, there were sizeable differences among provinces in the amount of increase. Median years of schooling of adult males increased 0.3 years in Prince Edward Island during this decade, and 0.9 years in Manitoba during this period.

There has been a definite trend toward a regional differentiation among the Canadian provinces in the level of educational attainment of the adult populations. British Columbia, the Prairie Provinces and Ontario as a group in 1961 had attained a position in which they all had populations of an economically productive age with more formal schooling than did the corresponding populations of Quebec and the Maritime provinces. In addition, school enrolment and pupil retention data

suggest that graduates from the school systems of these five western provinces will have more schooling than their counterparts in the five eastern provinces, so that the educational level gap is likely to further widen in the future.

170

FOOTNOTES FOR CHAPTER III

[1] 1961 <u>Census of Canada</u>, Bulletin 3:1-6, Table 102.

[2] Figures in Table I and subsequent tables in this chapter exclude persons "enrolled in school."

[3] 1961 <u>Census of Canada</u>, Bulletin 3:1-6, Table 103.

[4] Gordon W. Bertram, <u>The Contribution of Education to Economic Growth</u> (Ottawa: The Economic Council of Canada, Staff Study No. 12, Jule, 1966), pp. 14-15.

[5] <u>Ibid.</u>, Table A-7, p. 82.

[6] <u>Vide supra</u>, p. 13.

[7] For a study of the involvement of females in Canadian economic life, <u>vide</u>: Department of Labour, <u>Women at Work in Canada</u> (Ottawa: The Queen's Printer, 1964).

[8] J. R. Podoluk, <u>Earnings and Education</u> (Ottawa: The Dominion Bureau of Statistics, December, 1965), p. 15.

[9] <u>Ibid.</u>, p. 20.   [10] <u>Ibid.</u>, p. 21.

[11] <u>Vide</u>: Isabel B. Anderson, <u>Internal Migration in Canada, 1921-61</u> (Ottawa: The Economic Council of Canada, Staff Study No. 13, March, 1966), for an examination of statistics of interprovincial migration of Canadian work force members.

[12] John E. Cheal, <u>Investment in Canadian Youth</u> (Toronto: The MacMillan Company of Canada, 1963), Chapter 3.

[13] <u>Ibid.</u>, p. 41.

[14] Dominion Bureau of Statistics, <u>Student Progress Through the Schools by Age and Grade, 1965</u> (Ottawa: The Queen's Printer, 1966), Table 3.

CHAPTER IV

CANADIAN INTERPROVINCIAL INCOME DISPARITIES AND THEIR RELATIONSHIP

TO INTERPROVINCIAL DIFFERENCES IN EDUCATIONAL LEVELS

In this chapter average levels of per capita income and individual earnings of provincial populations are examined and compared. Several measures are available for demonstrating income differentials that exist among the provinces, and the advantages and disadvantages of various measures are reviewed.

The general relationship between these average income levels within provinces and average educational levels of provincial populations that were presented in Chapter III is determined. As was noted previously,[1] statistical studies that have attempted to explain Canadian regional income disparities in terms of differences in population educational levels have met with little success to date.

I. AVERAGE INCOME MEASURES

In the determination of the degree of economic well-being of populations of regions, consideration must be given to the measuring units that are employed. Economists have noted the distinction between wealth and income, wealth being considered a "stock," and income a "flow," and wealth being significant chiefly because of the income which derives from it and the economic power which it confers upon its owners.[2] A further distinction is often made between income and

earnings. Income is normally a macroconcept, measured in terms of the total economy of a nation or region;[3] earnings, on the other hand, is a microconcept, referring to money receipts of individuals. Numerous measures are available for each of these.

In the National Accounts[4] of Canada, five major income components are presented: income from employment in the form of wages, salaries and supplementary labour income; net income received by farm operators from farm production; net income from non-farm unincorporated business; interest, dividends and net rental income; and government transfer payments. "Earned income" incorporates the first three of these five components. "Personal income" incorporates all five. "Personal disposable income" consists of total personal income less personal direct taxes.

These several income measures may be expressed in gross total amounts, or, when used for making comparisons between regions, in terms of individual units such as per household, per family, per person, or per person employed,[5] depending on the type of comparison wanted and the use which is to be made of the values that are determined. Census tabulations of earnings normally are obtained from individual responses to questions concerning annual earnings from employment or total personal income during the year preceding the census.

It can be seen that, with several income and earnings measures available, and many ways of expressing each of them, the total number of such measures that could be employed is quite large. In this study five income and earnings measures are used: earned income per capita,

earned income per employed person, personal income per capita, personal

income per employed person, and average annual earnings of household

heads. Personal income per capita is an approximate indicator of the

level of economic welfare of an area,[6] whereas personal income per

employed person is a good indicator of the level of economic welfare of

a region in terms of the persons chiefly responsible for its attainment.

Earned income excludes both the investment component and transfer pay-

ments to individuals, such as family allowances, and is sometimes con-

sidered a better measure for comparing the internal productivity of a

region.[7] Because transfer payments to individuals are paid by govern-

ments on a basis that does not discriminate regionally, their net effect

is to reduce the degree of regional income disparities.[8]

Average income measures employed in this study are averages for

a three-year period centered on the middle year, and are expressed with

a bar over the last two digits of the middle year. Thus "Personal

Income per Capita 1961" refers to the average personal income per

person for the three years 1960, 1961, and 1962. Average personal

income and earned income statistics are available annually for the

nation and for each province from the National Accounts.

A somewhat different method is used in determining three-year

average per employed person measures than for per capita measures.

The gross average values of the relevant components are totalled and

averaged, and these averages are divided by the number of persons

employed in the middle year of the three-year period. This procedure

is necessary because provincial employment figures are available only

for census years.

II. INCOME DISPARITIES AMONG THE CANADIAN PROVINCES

In this section comparisons of average per capita income levels of Canadian provincial populations with those of other national populations are made. In addition, average income levels of the Canadian provinces in both 1951 and 1961 are tabulated.

Comparisons Between Canadian Provincial and Other National Incomes

During recent decades, per capita income in Canada has been sufficiently high to make the country one of the most economically advanced nations of the world. Russett et al., in a tabulation of 107 nations classified by gross national product per capita in 1957, placed Canada second behind the United States in per capita income.[9] The first fourteen nations in this list, referred to as "High Mass Consumption Societies,"[10] with GNP per capita for 1957 in United States dollars shown, were:

1.	United States - 2,577	8.	Belgium - 1,196
2.	Canada - 1,947	9.	United Kingdom - 1,189
3.	Switzerland - 1,428	10.	Norway - 1,130
4.	Luxembourg - 1,388	11.	Denmark - 1,057
5.	Sweden - 1,380	12.	France - 943
6.	Australia - 1,380	13.	West Germany - 927
7.	New Zealand - 1,310	14.	Netherlands - 836

Since GNP figures are not available for provinces, one cannot determine directly where the Canadian provinces would be placed in such

a list. However, it is possible to obtain an approximation of their

hypothetical placing in this listing by using personal income per

capita figures that are available for Canada and the provinces. One may

assume that a "hypothetical GNP per capita" value can be obtained for

each province by multiplying its personal income per capita for 1957

by the same factor that is used to convert the 1957 personal income per

capita for Canada ($1,401 Canadian) to Canada's 1957 GNP per capita

shown in the Russett et al. list ($1,947 U.S.).[11] This factor is 1.39.

The 1957 values for "hypothetical GNP per capita in $U.S." for the

provinces are presented in Table XIII.

When "Canada" is replaced by the ten provinces in the Russett

et al. listing, the first twenty-three "nations," with real or hypo-

thetical GNP per capita values in U.S. dollars for 1957 shown, becomes:

1. United States - 2,577	13. New Zealand - 1,310
2. British Columbia - 2,348	14. New Brunswick - 1,276
3. Ontario - 2,306	15. Belgium - 1,196
4. Alberta - 2,046	16. United Kingdom - 1,189
5. Manitoba - 1,890	17. Norway - 1,130
6. Saskatchewan - 1,850	18. Prince Edward Island - 1,115
7. Nova Scotia - 1,672	19. Newfoundland - 1,074
8. Quebec - 1,664	20. Denmark - 1,057
9. Switzerland - 1,428	21. France - 943
10. Luxembourg - 1,388	22. West Germany - 927
11. Sweden - 1,380	23. Netherlands - 836
12. Australia - 1,316	

TABLE XIII

PERSONAL INCOME PER CAPITA 1957 AND HYPOTHETICAL "GROSS
NATIONAL PRODUCTS" OF CANADA AND THE PROVINCES
CALCULATED FOR 1957

	1957 personal income per capita $Can.	Hypothetical 1957 GNP per capita in $US
Newfoundland	773	1,074
Prince Edward Island	802	1,115
Nova Scotia	1,023	1,672
New Brunswick	918	1,276
Quebec	1,197	1,664
Ontario	1,659	2,306
Manitoba	1,360	1,890
Saskatchewan	1,331	1,850
Alberta	1,472	2,046
British Columbia	1,689	2,348
Canada	1,401	1,947

Source: Dominion Bureau of Statistics, National Accounts,
Income and Expenditure, 1961, Table 29.

Note: Hypothetical GNP per Capita in $US is determined by
multiplying Personal Income per Capita by the factor 1.39. This value
is found by dividing $1,947 (Canada's GNP per Capita in $US) by $1,401
(Canada's Personal Income per Capita 1957).

Ninety-three additional nations follow in this list, which ends with Nepal whose GNP per capita in 1957 was equal to 45 United States dollars.

This tabulation, despite the inadequacies in the method employed, tends to emphasize two important facts: first, that the populations of all the Canadian provinces, in terms of the total world population, are comparatively well off; and second, that very substantial differences exist in the relative degree of affluence of Canadian provincial populations.

Interprovincial Income Comparisons

Four sets of tabulations showing average income values for Canada and the provinces are presented in Tables XIV to XVII. In Tables XIV and XV, values for personal income per capita and per employed person are shown for the years 1951 and 1961. In Tables XVI and XVII, earned income figures for 1951 and 1961 are given. In each of these tables, the rank order from highest to lowest values are also presented, as are index values determined by making the value for Canada equal to 100.

Some general observations concerning these four tables may be made. In both 1951 and 1961 the five western provinces ranked higher in all income measures than the five eastern provinces. Amongst the five western provinces there is a fair amount of difference in the rank ordering on different income measures, but generally speaking, values for British Columbia and Ontario are roughly equivalent and rank first and second, Alberta ranks third, while Saskatchewan and Manitoba rank fourth and fifth.

TABLE XIV

PERSONAL INCOME PER CAPITA AND PER EMPLOYED PERSON
IN CANADA AND THE PROVINCES, 1951

	\$	Per Capita Index	Rank	Personal Income 1951 Per Employed Person \$	Index	Rank
Newfoundland	553	50	10	1,911	63	9
Prince Edward Island	625	57	9	1,869	62	10
Nova Scotia	783	71	7	2,440	81	7
New Brunswick	731	66	8	2,304	76	8
Quebec	920	83	6	2,606	86	6
Ontario	1,306	118	2	3,288	109	4
Manitoba	1,096	99	5	2,940	97	5
Saskatchewan	1,204	109	4	3,365	111	3
Alberta	1,227	111	3	3,361	111	2
British Columbia	1,328	120	1	3,635	120	1
Canada	1,104	100	--	3,019	100	--

Source: Dominion Bureau of Statistics, National Accounts, Income
and Expenditure, 1926-56.

TABLE XV

PERSONAL INCOME PER CAPITA AND PER EMPLOYED PERSON
IN CANADA AND THE PROVINCES, 1961

| | Personal Income 1961 | | | | | |
| | Per Capita | | | Per Employed Person | | |
	$	Index	Rank	$	Index	Rank
Newfoundland	924	58	10	3,963	84	8
Prince Edward Island	1,000	63	9	3,252	69	10
Nova Scotia	1,205	76	7	4,163	89	7
New Brunswick	1,074	68	8	3,851	82	9
Quebec	1,382	87	6	4,304	92	6
Ontario	1,860	117	1	5,041	107	2
Manitoba	1,581	99	4	4,468	95	4
Saskatchewan	1,465	92	5	4,304	92	5
Alberta	1,617	102	3	4,608	98	3
British Columbia	1,828	115	2	5,439	116	1
Canada	1,589	100	--	4,701	100	--

Source: Dominion Bureau of Statistics, National Accounts, Income and Expenditure, 1961, and J. G. Scoville, The Job Content of the Canadian Economy (Dominion Bureau of Statistics, Ottawa, Special Labour Force Study No. 3, 1967), p. 22.

TABLE XVI

EARNED INCOME PER CAPITA IN CANADA AND THE PROVINCES
1951 and 1961

| | Earned Income per Capita | | | | | |
| | 1951 | | | | 1961 | |
	$	Index	Rank	$	Index	Rank
Newfoundland	458	49	10	711	57	9
Prince Edward Island	500	53	9	692	56	10
Nova Scotia	638	68	7	880	71	7
New Brunswick	609	65	8	801	64	8
Quebec	777	83	6	1,086	87	6
Ontario	1,121	119	2	1,464	118	1
Manitoba	941	100	5	1,234	99	4
Saskatchewan	1,039	111	4	1,136	91	5
Alberta	1,065	113	3	1,288	104	3
British Columbia	1,122	119	1	1,435	115	2
Canada	940	100	--	1,243	100	--

Source: Dominion Bureau of Statistics, National Accounts, Income and Expenditure, 1962 and 1967.

TABLE XVII

EARNED INCOME PER EMPLOYED PERSON IN CANADA AND THE PROVINCES
1951 and 1961

| | Earned Income per Employed Person | | | | | |
| | 1951 | | | 1961 | | |
	$	Index	Rank	$	Index	Rank
Newfoundland	1,574	62	9	3,044	83	7
Prince Edward Island	1,494	58	10	2,258	61	10
Nova Scotia	1,981	78	7	3,039	83	8
New Brunswick	1,910	75	8	2,870	78	9
Quebec	2,193	86	6	3,382	92	6
Ontario	2,789	109	4	3,971	108	2
Manitoba	3,506	98	5	3,489	95	4
Saskatchewan	2,888	113	3	3,440	94	5
Alberta	2,902	114	2	3,670	100	3
British Columbia	3,037	119	1	4,267	116	1
Canada	2,556	100	--	3,678	100	--

Source: Dominion Bureau of Statistics, National Accounts, Income
and Expenditure, 1962 and 1967; J. G. Scoville, The Job Content of the
Canadian Economy (Dominion Bureau of Statistics, Ottawa, Special Labour
Force Study No. 3, April, 1967), p. 22.

Because of great fluctuations in farm income for Saskatchewan, the rank-
ing of this province in terms of average income is subject to consider-
able change.

It is interesting to note that Quebec's ranking in all eight
tables remains fixed at sixth.

Among the four Maritime provinces, Nova Scotia ranks seventh and
ahead of its neighbouring provinces in all income measures with the
exception of earned income per employed person in 1961, where it is
preceded by Newfoundland. New Brunswick ranks eighth in Canada on six
of the income measures and ninth on two. Prince Edward Island and
Newfoundland generally share ninth and tenth positions.

Notable differences are found in per capita and per employed
person index figures in these tables. Income disparities among the
provinces appear to be greater when expressed in per capita values. For
example, with personal income 1961 figures in Table XV, index numbers
range from 58 to 118 for per capita values, and from 70 to 117 for per
employed person values. These figures tend to confirm Chernick's
conclusion that average per capita income differences among the Canadian
provinces are affected to a considerable degree by employment participa-
tion rates, the age structure within the provinces, and the percentage
of labour-force membership among the total population of the province.[12]

A fifth tabulation of differences in income among the Canadian
provinces is provided in Table XVIII. This table, derived from 1961
census tabulations, shows differences in average earnings of family
heads among the Canadian provinces for the year preceding May 31, 1961.

TABLE XVIII

AVERAGE EARNINGS OF FAMILY HEADS IN CANADA AND THE
PROVINCES FOR THE YEAR ENDING MAY 31, 1961

| | Average Earnings of Family Head 1961 | | |
	$	Index	Rank
Newfoundland	3,143	76	9
Prince Edward Island	2,845	69	10
Nova Scotia	3,431	83	7
New Brunswick	3,189	77	8
Quebec	3,948	96	5
Ontario	4,400	106	2
Manitoba	4,028	97	4
Saskatchewan	3,830	93	6
Alberta	4,242	103	3
British Columbia	4,443	108	1
Canada	4,133	100	--

Source: 1961 Census of Canada, Bulletin 2:1-9, Table 80.

There are two major differences between the tabulations in Table XVIII and those in Tables XIV to XVII, when 1961 values are compared. The first major difference is that Quebec's rank changes to fifth position in Table XVIII ahead of Saskatchewan, probably because of the lower-than-average farm income in Saskatchewan during the 1961 crop year; the second major difference is that the range in index numbers in Table XVIII is somewhat smaller than in some other tables.

Because of the importance of the variations among the provinces in average incomes to the social and economic life of Canada, these variations among the provinces are examined more closely in the following section.

Variations in Average Provincial Incomes, 1951 and 1961

The extent of Canadian interprovincial income disparities may be demonstrated in various ways: through the use of absolute dollar values in the several income measures employed, by using index numbers, or with various statistical measures.

One statistical measure that is often used in economic studies to show the size of income variations among regions is the coefficient of variation. The coefficient of variation is defined as the standard deviation divided by the mean.[13] This measure, which is sometimes termed the "index of dispersion," was used extensively in Chernick's study of Canadian interregional income disparities.[14] Chernick described the utility of this measure in evaluating the interregional structure of personal income per capita as follows:

The value of the index for any given year. . .indicates the extent to which personal income per capita in the various regions cluster about the national average. The higher the index, the greater is the dispersion or spread around the average, and the lower is the degree of regional participation in national economic activity. The opposite would apply to a lower value of the index.[15]

Table XIX shows the extent of Canadian interprovincial income disparities in 1951 and 1961 in three different ways: with absolute dollar values of average provincial incomes, with index numbers, and through the use of coefficients of variation expressed in per cent.

An examination of the range in index numbers, and of the coefficients of variation, between 1951 and 1961 in all of the first four income measures shown in this table would suggest that interprovincial income disparities in Canada have decreased slightly during this ten-year period. For example, the coefficient of variation in personal income per capita decreased from 29.8 per cent in 1951 to 24.0 per cent in 1961. This table also points out the difference between per capita and per employed person income measures that was noted previously. It is also important to note here, because of its extensive use in Chapter V, that the range and coefficient of variation of the "annual earnings of family head" measure are quite similar to those for both the 1961 "earned income per employed person" and "personal income per employed person" measures. This would tend to support the contention that tabulations of annual earnings of family heads provided in the 1961 Census of Canada reports are suitable for determining the education-earnings relationship within the Canadian provinces.

TABLE XIX

VARIATIONS IN AVERAGE CANADIAN PROVINCIAL INCOMES
1951 and 1961

Average Provincial Income Measure and Year	Range Absolute Dollars	Range in Index Values (Canada=100)	Coefficient of Variation
Personal Income per Capita			
1951	553–1,328	50–120	29.8
1961	624–1,860	58–117	24.0
Personal Income per Employed Person			
1951	1,869–3,635	62–120	22.8
1961	3,252–5,439	69–116	14.1
Earned Income per Capita			
1951	458–1,122	49–119	31.7
1961	692–1,464	56–118	26.9
Earned Income per Employed Person			
1951	1,494–3,037	58–119	24.7
1961	2,258–4,267	61–116	17.2
Annual Earnings of Family Head			
1961	2,845–4,443	69–108	15.1

Sources: Tables XIV–XVII, pages 74–77, and 79.

III.   THE RELATIONSHIP BETWEEN AVERAGE LEVELS OF EDUCATION AND
INCOME OF PROVINCIAL POPULATIONS

The final objective of this chapter is to determine the degree
of relationship between the average levels of educational attainment
of provincial populations found in Chapter III and the several measures
of average provincial income and earnings presented in the preceding
section.

Pearson product moment correlation coefficients were calculated
for both the mean and median levels of educational attainment of the
male provincial populations aged 20-64 in relation to the average
provincial income measures presented in Tables XIV through XVIII, for
the two years 1951 and 1961. The resulting correlation coefficients
are presented in Table XX.

The correlations between provincial educational levels and
average income levels are all very high, both for 1951 and 1961, all
being significant beyond the .05 level of confidence, and most being
significant beyond the .01 level of confidence. Correlations for 1961
data are higher than for corresponding 1951 figures in most of the
measures shown, suggesting that the relationship between education and
earnings among provincial populations may be becoming more direct within
the last decade.

IV.   CONCLUSION

The consistently high correlations between the two variables,
educational levels and income levels of provincial populations, is

TABLE XX

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS BETWEEN AVERAGE
EDUCATIONAL LEVELS OF PROVINCIAL MALE POPULATIONS AGED 20-64
AND AVERAGE PROVINCIAL INCOME LEVELS - 1951 AND 1961

	Pearson r Between Income Measure Shown and Educational Measure:	
Income Measure	Mean	Median
1951 personal income per capita	.743[a]	.723[a]
1951 personal income per employed person	.683[b]	.685[b]
1951 earned income per capita	.715[b]	.692[b]
1951 earned income per employed person	.656[b]	.651[b]
1961 personal income per capita	.626[b]	.724[a]
1961 personal income per employed person	.863[a]	.833[a]
1961 earned income per capita	.900[a]	.868[a]
1961 earned income per employed person	.673[b]	.775[a]
1961 annual earnings of family head	.822[a]	.809[a]

[a]Indicates significance at the .01 per cent level of confidence
(.716 required for significance).

[b]Indicates significance at the .05 per cent level of confidence
(.549 required for significance).

somewhat surprising, considering the numerous other possible causes
of Canadian regional income disparities that have been identified in
economic studies: differences in natural resource endowments, in
capital investment, in labour force participation rates, in the struc-
ture of economic activities, in infrastructure, in the relative mobility
of provincial populations, and other factors.

Perhaps the educational level of populations is a basic key
factor that contributes to income differentials in economically advanced
nations, and several of the other possible factors are associated
with this one in some complicated fashion. In economic theory the
traditional trinity of land, capital and labour were once thought to be
principally involved in the determination of the wealth of nations. But
there have been many examples of peoples living in relative poverty in
areas where natural resource endowments were abundant; and the modern
world presents several other examples of populations deriving relatively
high living standards in areas where natural resource endowments are very
limited. The extent of capital investment is also an imperfect measure
of the productivity and well-being of nations. The Economic Council of
Canada has estimated that investment in capital stock in Canada is
about twenty-three per cent greater than in the United States,[16] but
Canadian living standards are well below U.S. levels.

A strong advance in education and knowledge among a population,
quite apart from its direct contribution to economic growth, "tends to
have powerful and pervasive effects in strengthening the potential role
of other sources of growth."[17] Perhaps the advance in education of a

population is <u>the</u> key factor in determining the level of economic well-being that the population enjoys.

Further evidence concerning the relative significance of population educational levels in the achievement of high per capita income levels is presented in Chapter VII.

FOOTNOTES FOR CHAPTER IV

[1]A brief review of studies in this area is presented in Chapter II, pp. 31-33.

[2]Cf. J. C. Weldon, "On the Economics of Social Democracy," in John J. Deutsch et al., The Canadian Economy (revised edition; Toronto: MacMillan, 1965), p. 153.

[3]Alfred W. Stonier and Douglas C. Hague, A Textbook of Economic Theory (third edition; London: Longmans, Green and Company, 1964), pp. 467-71.

[4]Dominion Bureau of Statistics, National Accounts, Income and Expenditure (Ottawa: The Queen's Printer, 1926-56, 1962, 1966).

[5]The Dominion Bureau of Statistics presents annual estimates of the total and provincial populations and monthly surveys of employment in Canada and the five major economic regions defined as: the Maritimes, Quebec, Ontario, the Prarie Region, and British Columbia. Annual estimates of provincial employment are not easily available. Estimates used in this study were obtained from: J. G. Scoville, The Job Content of the Canadian Economy (Dominion Bureau of Statistics, Ottawa, Special Labour Force Study No. 3, April, 1967), and are available only for the decennial years of 1941-61.

[6]S. E. Chernick, Interregional Disparities in Income (Ottawa: The Economic Council of Canada, Staff Study No. 14, August, 1966), p. 5.

[7]Ibid., p. 23.

[8]Economic Council of Canada, Towards Sustained and Balanced Economic Growth (second annual review; Ottawa: The Queen's Printer, December, 1965), p. 113.

[9]Bruce M. Russett et al., World Handbook of Political and Social Indicators (New Haven, Conn.: Yale University Press, 1964), Table B2, pp. 294-98.

[10]The fourteen nations in this group all had per capita incomes equal to at least thirty per cent of the United States level in 1957.

[11]Vide: Hugh Whalen, "Public Policy and Regional Development: The Experience of the Atlantic Provinces," in: Abraham Rotstein (ed.), The Prospect for Change: Proposals for Canada's Future (Toronto: McGraw-Hill Book Company, 1965), pp. 103-105, for a discussion of measures similar to gross national product applicable to regions and provinces. Whalen suggests (p. 105 n.) that "indexes of provincial economic performance relative to the national average produce essentially the same result

whether estimates of provincial personal income per capita, disposable income per capita, or gross product per capita are used." Chernick, _op. cit._, p. 5 n., states, "At the national level, the personal income series represents a fairly good estimator of movements in Gross National Product."

[12]Chernick, _op. cit._, pp. 23-26.

[13]Quinn McNemar, _Psychological Statistics_ (second edition; New York: John Wiley and Sons, 1955), pp. 161-62.

[14]Chernick, _op. cit._   [15]_Ibid._, p. 6.

[16]Economic Council of Canada, _op. cit._, p. 60.

[17]_Ibid._, p. 67.

CHAPTER V

INTERPROVINCIAL DIFFERENCES IN AVERAGE ANNUAL EARNINGS ASSOCIATED

WITH SEVERAL LEVELS OF EDUCATIONAL ATTAINMENT

I. INTRODUCTION

Two basic problems were identified for this study. The first,
examined in Chapters III and IV, dealt with the relationship between
average educational and income levels of provincial adult populations.
The second, examined in this and the following chapter, is concerned
with differences among the Canadian provinces in the relationship
between educational levels of individuals and average annual and life-
time earnings associated with these levels. The objective of this
section of the study is to determine, using recent census data, whether
persons with similar amounts of schooling earn substantially the same,
or significantly different, annual and lifetime earnings in the ten
Canadian provinces. Annual earnings are examined in the present
chapter. Lifetime earnings are examined in Chapter VI.

Two Canadian studies using 1961 census data found that increas-
ing levels of educational attainment conferred upon persons increasing
annual and lifetime earnings when the nation as a whole was considered.
Calculations by Bertram showed that the average annual earnings in 1961
of male Canadian labour force members were as follows: those with 0-4
years of elementary education earned $2,758 per annum; 5-7 years
elementary--$3,439; eight years elementary--$3,970; 1-3 years secondary--

$4,530; four years secondary--$5,469; five years secondary--$5,878; some university--$6,332; and university degree--$9,576. The average annual earnings of all Canadian male labour force members was $4,602.[1] Clearly, increased education is rewarded by increased annual earnings in Canada.

The Podoluk investigation, again based on 1961 data, found that lifetime earnings increased dramatically with increased educational attainment. Canadian males with 0-8 years of schooling could expect lifetime earnings of $131,026; those with 1-3 years of secondary education would earn $168,257; with 4-5 years secondary--$209,484; some university--$234,448; those with university degrees could anticipate lifetime earnings of $353,624.[2]

It is intended to determine whether such education-earnings relationships are relatively uniform across Canada, or whether there are gross differences to be found in these relationships among the Canadian provinces.

There is some general evidence to suggest that there are differences among the provinces in the education-earnings relationship. Department of Labour statistics on differences among the provinces in average wage rates for specific occupations suggest that persons with similar education and occupational training have substantially different earnings in different parts of Canada.[3] For example, in October, 1965, hourly wages of bread bakers in Canada were $2.02; but the variations across Canada were as follows: Nova Scotia--$1.41, New Brunswick--$1.65, Quebec--$1.90, Ontario--$2.01, Manitoba--$2.23, Saskatchewan--$2.49,

Alberta--$2.38, and British Columbia--$2.53.[4]

A further indication is suggested in the Podoluk report. In this study, indexes of dispersion[5] of annual earnings of male Canadians within specific occupational groups were calculated. For some occupations, such as locomotive engineers, the indexes of dispersion were relatively small, in the order of .465. For many others, such as pharmacists, optometrists and dentists, whose indexes were .632, .793, and .818 respectively,[6] the variations were quite large, suggesting very substantial differences in average earnings across Canada for persons with relatively similar educational backgrounds and occupational training.

Finally, the existence in Canada of extensive internal migration of people between provinces suggests that average earnings of individuals having similar schooling vary substantially across the country. Studies of the reasons for these internal movements of people within Canada have concluded that much of it is motivated by economic considerations. Isabel B. Anderson, for example, suggested that internal migration in Canada, whether from farm to urban areas, or between provinces, may be "largely due to the presence or lack of economic opportunities."[7]

Two sets of tabulations from the 1961 Census of Canada are used to show the education-earnings relationship for each of the Canadian provinces. The first is based on education and earnings data obtained from a twenty per cent sample of the Canadian population,[8] and provides a general comparison among the provinces of average total annual income figures associated with six levels of schooling, for both males and

females. The second is descriptive of Canadian and provincial family

heads, and provides detailed data on average annual earnings associated

with eight levels of educational attainment and six age classifications

of family heads.[9] The bulk of the data for this and the following

chapter is taken from this latter set of tabulations.

In order to determine whether the findings based upon 1961 data

were peculiar to that year, or if they represented patterns that exist

over time, it was originally intended to employ similar data from the

1951 decennial census. Unfortunately, no figures relating provincial

educational levels with earnings are available in the 1951 census reports.

Figures from the 1941 census, again based on annual earnings of family

heads, were used to check findings derived from 1961 data.

II. POPULATION SAMPLE DATA

1961 census statistics of a twenty per cent sample of the Canadian

population provide total income figures for both males and females aged

fifteen years and over in the non-farm population, classified by

several income groups, and six educational level categories. Income

figures employed in these tabulations represent total individual income,

including income from employment, investment income, et cetera, received

during the twelve-month period ending May 31, 1961. These figures are

examined in the following sections, to determine whether differences

were found among the provinces in average total annual incomes of both

males and females included within the six educational level classifica-

tions shown in these tables.

Interprovincial Differences in Annual Incomes of Males

In Table XXI are tabulated average total annual incomes during the year ending May 31, 1961 of non-farm males aged fifteen and over classified by six levels of schooling for Canada and the provinces. For ease of comparison, index values, with the average for Canada in each educational level category equal to 1.00, are included. Coefficients of variation among the ten Canadian provinces of the total income figures presented are also included in the table.

Table XXI indicates that the 1961 average total annual income for males with no schooling varied from $1,235 in Saskatchewan to $2,218 in Ontario, with the Canadian average equal to $1,715. Average annual income in 1961 for persons with a university degree in Prince Edward Island was $6,823; in Ontario it was $9,370, while the Canadian average was $9,048. Similar variations are found in the table in each of the other educational level categories.

An indication of the extent of the variations among the provinces in average total annual incomes associated with these six levels of schooling is provided by both the range in index numbers, and by the coefficients of variation. The range in index numbers is as follows: no schooling--.72-1.29; kindergarten and elementary--.70-1.10; secondary 1-3 years--.80-1.05; secondary 4-5 years--.77-1.05; some university--.77-1.06; and university degree--.75-1.04. The corresponding coefficients of variation among the provinces for the six educational level categories are: 18.0 per cent, 16.7 per cent, 9.9 per cent, 10.3 per cent, 11.0 per cent and 9.8 per cent.

TABLE XXI

AVERAGE TOTAL INCOME OF THE MALE NON-FARM POPULATION 15 YEARS OF AGE AND OVER BY LEVEL OF SCHOOLING FOR THE YEAR ENDING MAY 31, 1961 - CANADA AND THE PROVINCES

Province	No Schooling $	Index	Kindergarten & Elementary $	Index	Secondary 1-3 Years $	Index	Secondary 4-5 Years $	Index	Some University $	Index	University Degree $	Index
Canada	1,715	1.00	3,134	1.00	3,943	1.00	4,825	1.00	4,995	1.00	9,048	1.00
Newfoundland	1,449	.94	2,210	.71	3,179	.81	3,886	.81	4,109	.82	8,133	.90
Prince Edward Island	--	--	2,185	.70	3,150	.80	3,889	.81	3,840	.77	6,823	.75
Nova Scotia	1,448	.84	2,378	.76	3,425	.87	4,265	.88	4,527	.91	7,722	.85
New Brunswick	1,467	.86	2,476	.79	3,654	.93	3,722	.77	4,087	.82	7,569	.84
Quebec	1,746	1.02	3,065	.98	3,793	.96	4,938	1.02	5,325	1.07	9,001	.99
Ontario	2,218	1.29	3,438	1.10	4,136	1.05	5,070	1.05	5,301	1.06	9,370	1.04
Manitoba	1,477	.86	2,943	.94	4,039	1.02	4,492	.93	4,574	.92	8,545	.94
Saskatchewan	1,235	.72	2,869	.92	3,729	.95	4,256	.88	4,223	.85	8,625	.95
Alberta	1,471	.86	3,236	1.03	4,032	1.02	4,582	.95	4,749	.95	9,309	1.03
British Columbia	1,731	1.01	3,340	1.07	4,074	1.03	4,509	.93	4,597	.92	8,796	.97
Coefficient of Variation	18.0%		16.7%		9.9%		10.3%		11.0%		9.8%	

Source: 1961 Census of Canada, Bulletin 4:1-1, Table A9.

When these values are compared with those in Table XIX (vide page 82), it is noted that variations among the provinces in average incomes for the "no schooling" and "kindergarten and elementary" categories are about equal to the interprovincial variations in "earned income per employed person 1961," and greater than those for "annual earnings of family head 1961." The variations in annual incomes for the four other educational level categories were somewhat smaller, but still of substantial magnitude.

The figures shown in Table XXI refer to average total incomes of persons included within the educational level classifications shown. It is important to note, however, that each average income figure shown in the table represents a wide distribution of incomes of persons having the amount of education shown. Some persons with little education in each province do manage to earn very high incomes, while others having the highest educational qualifications earn low incomes.

An indication of this is given in Table XXII. In this table, percentage distributions of provincial and Canadian males, aged fifteen and over, among seven income groups are presented for the six educational level classifications shown in the previous table. The first set of tabulations in Table XXII shows the distribution for persons with no schooling, and indicates, for example, that 13.7 per cent of the males aged fifteen and over in Newfoundland in 1961 had annual incomes of less than $500, 54.3 per cent had incomes between $500 and $1,499, and 0.3 per cent of those persons with no schooling in Newfoundland had total incomes in 1961 of $10,000 or more.

TABLE XXII

PERCENTAGE DISTRIBUTION OF THE MALE NON-FARM POPULATION 15 YEARS
OF AGE AND OVER BY INCOME GROUP, SHOWING TOTAL INCOME BY SIZE
FOR THE YEAR ENDED MAY 31, 1961 - CANADA AND THE PROVINCES
IN SIX EDUCATIONAL LEVEL CLASSIFICATIONS

Province	Income Group						
	Under $500	$500-1499	$1500-2999	$3000-4499	$4500-5999	$6000-9999	$10,000 +
Males with no Schooling							
Newfoundland	13.7%	54.3%	22.8%	6.4%	2.0%	0.5%	0.3%
Prince Edward Is.	-	-	-	-	-	-	-
Nova Scotia	14.4	56.3	17.3	9.1	2.3	0.4	0.3
New Brunswick	15.1	52.5	23.0	7.8	0.8	0.6	0.2
Quebec	16.7	47.9	20.4	10.3	3.0	1.0	0.7
Ontario	15.2	42.4	19.2	15.8	4.3	2.1	1.0
Manitoba	18.7	52.8	13.9	10.4	3.3	0.7	0.2
Saskatchewan	20.9	59.1	12.1	5.8	0.8	0.8	0.4
Alberta	21.1	48.4	20.4	7.4	1.6	0.8	0.4
British Columbia	13.9	51.1	18.0	12.4	3.0	1.1	0.5
Canada	16.4	49.5	19.0	10.6	2.8	1.1	0.6
Males with Kindergarten and Elementary Schooling							
Newfoundland	18.4	30.8	27.1	15.6	6.3	2.2	0.6
Prince Edward Is.	12.7	35.5	30.9	14.5	4.1	1.6	0.8
Nova Scotia	16.0	26.5	28.4	20.4	6.3	1.7	0.6
New Brunswick	14.7	25.6	29.5	21.6	5.6	2.1	0.8
Quebec	11.1	18.4	25.7	28.7	10.7	4.1	1.2
Ontario	8.2	15.4	21.5	31.5	16.1	6.0	1.3
Manitoba	10.6	22.1	23.3	28.7	10.4	3.8	1.1
Saskatchewan	14.1	25.3	22.1	23.7	8.8	4.5	1.6
Alberta	9.6	19.2	21.7	29.7	12.6	5.4	1.7
British Columbia	8.3	20.5	19.5	26.4	16.3	7.6	1.2
Canada	10.5	19.1	23.7	28.2	12.4	4.9	1.2

TABLE XXII (continued)

Province	Under $500	$500-1499	$1500-2999	Income Group $3000-4499	$4500-5999	$6000-9999	$10,000 +
			Males with One to Three Years Secondary Schooling				
Newfoundland	26.5	14.8	19.4	20.9	11.2	5.8	1.4
Prince Edward Is.	17.5	16.6	27.2	23.0	8.1	5.4	2.1
Nova Scotia	17.4	12.0	21.3	27.3	24.4	6.2	1.5
New Brunswick	20.8	9.4	19.0	27.8	14.2	6.8	1.8
Quebec	20.4	8.7	17.7	27.7	15.7	7.8	2.0
Ontario	16.2	6.9	13.0	28.2	22.2	11.4	2.1
Manitoba	14.2	8.3	15.7	31.3	18.8	9.5	2.4
Saskatchewan	19.6	10.0	16.1	26.5	16.1	9.4	2.3
Alberta	14.8	8.2	14.8	29.2	19.8	10.8	2.4
British Columbia	15.7	9.2	13.1	25.7	22.0	12.3	2.0
Canada	17.6	8.4	15.5	27.7	19.0	9.8	2.0
			Males with Four to Five Years Secondary Schooling				
Newfoundland	23.4	13.7	15.1	18.7	13.8	12.0	3.3
Prince Edward Is.	15.4	10.1	20.9	23.9	16.0	10.0	3.9
Nova Scotia	16.7	7.8	14.6	24.5	18.6	14.4	3.4
New Brunswick	21.5	8.0	18.1	25.8	14.8	9.5	2.2
Quebec	16.4	6.5	13.0	24.1	18.7	15.4	5.9
Ontario	9.9	6.7	10.1	23.5	23.8	20.2	5.9
Manitoba	10.8	8.1	14.0	28.2	19.7	14.4	4.7
Saskatchewan	12.5	9.5	14.4	25.4	19.6	14.8	3.7
Alberta	9.3	8.5	12.9	25.9	22.0	17.1	4.3
British Columbia	8.7	10.1	13.3	24.3	22.5	17.2	3.9
Canada	12.1	7.4	12.0	24.2	21.6	17.5	5.2

TABLE XXII (continued)

Province	Income Group						
	Under $500	$500- 1499	$1500- 2999	$3000- 4499	$4500- 5999	$6000- 9999	$10,000 +
Males with Some University Education							
Newfoundland	14.4	15.3	15.5	21.4	13.8	14.5	5.1
Prince Edward Is.	14.1	14.6	13.2	29.0	14.4	9.5	5.3
Nova Scotia	12.3	16.6	11.8	16.8	18.0	18.7	5.6
New Brunswick	15.3	16.1	13.3	18.7	18.2	13.5	4.9
Quebec	19.8	11.1	8.1	16.7	16.2	19.6	8.5
Ontario	9.2	14.7	9.5	17.1	17.9	22.6	8.9
Manitoba	9.6	16.1	12.7	20.7	17.3	17.6	6.0
Saskatchewan	10.0	18.3	12.2	19.3	20.5	15.2	4.4
Alberta	8.4	16.1	12.0	18.4	19.1	21.2	6.0
British Columbia	7.1	17.7	13.7	17.8	17.7	19.9	6.1
Canada	12.1	14.6	10.4	17.6	17.5	20.2	7.6
Males with University Degrees							
Newfoundland	4.0	5.0	6.5	13.8	12.5	31.0	27.2
Prince Edward Is.	-	9.1	5.6	25.1	18.4	27.5	14.4
Nova Scotia	2.5	6.8	6.8	14.5	16.3	32.1	21.1
New Brunswick	3.8	6.5	5.7	14.7	14.5	36.9	17.8
Quebec	4.8	5.0	5.4	9.5	13.8	33.1	28.2
Ontario	2.5	4.7	5.1	8.4	12.2	37.0	30.1
Manitoba	2.8	5.3	6.8	10.6	13.0	35.6	25.9
Saskatchewan	2.3	5.0	5.6	9.5	13.1	39.8	24.9
Alberta	2.3	4.1	5.1	8.4	10.6	40.4	29.0
British Columbia	2.5	5.2	7.1	9.6	12.4	37.3	25.9
Canada	3.0	5.0	5.5	9.4	12.8	36.1	28.2

Source: 1961 Census of Canada, Bulletin 4:1-2, Table A9.

Similar distributions of males aged fifteen and over having five other levels of education in each province among the same seven income groups are provided in the other sets of figures in Table XXII. It will be noted in the section applicable to those having university degrees that rather large interprovincial differences are found among the higher income groups. For example, 14.4 per cent of males in Prince Edward Island fifteen years of age and over with university degrees had total incomes in 1961 of $10,000 or more, while the corresponding percentage in Ontario was 30.1 per cent.

Interprovincial Differences in Annual Incomes of Females

Interprovincial differences in total annual average incomes of the female population aged fifteen and over in 1961 are indicated in Table XXIII. Incomes of females with no schooling varied from an average of $690 in Newfoundland to $1,005 in Ontario, while the average for Canada was $888. The range in incomes for females having kindergarten and elementary schooling was from $773 in Newfoundland to $1,337 in Quebec. Total annual average incomes in 1961 of females in the four other educational categories are shown in the table.

Interprovincial variations in total average annual incomes of females in 1961 are indicated by both the index numbers, and by the coefficients of variation shown in Table XXIII. The range in index values for females with no schooling was from .78-1.13; for those with kindergarten and elementary schooling this range was from .62-1.07; for those with from one to three years secondary schooling the range was from .64-1.09, while for females having four or five years secondary

TABLE XXIII

AVERAGE TOTAL INCOME OF THE FEMALE NON-FARM POPULATION 15 YEARS OF AGE AND OVER BY
LEVEL OF SCHOOLING FOR THE YEAR ENDING MAY 31, 1961 - CANADA AND THE PROVINCES

Province	No Schooling $	Index	Kindergarten & Elementary $	Index	Secondary 1-3 Years $	Index	Secondary 4-5 Years $	Index	Some University $	Index	University Degree $	Index
Canada	888	1.00	1,247	1.00	1,589	1.00	2,080	1.00	2,535	1.00	3,348	1.00
Newfoundland	690	.78	773	.62	1,384	.87	1,478	.71	2,142	.84	3,523	1.04
Prince Edward Island	--	--	781	.63	1,009	.64	1,530	.74	1,694	.67	--	--
Nova Scotia	813	.92	816	.65	1,232	.78	1,682	.81	2,113	.83	3,054	.90
New Brunswick	795	.90	884	.71	1,345	.85	1,671	.80	2,197	.87	2,861	.85
Quebec	964	1.09	1,337	1.07	1,734	1.09	2,214	1.06	2,752	1.09	2,985	.88
Ontario	1,005	1.13	1,312	1.05	1,659	1.04	2,204	1.06	2,558	1.01	3,598	1.06
Manitoba	834	.94	1,104	.89	1,519	.96	1,876	.90	2,211	.87	3,313	.97
Saskatchewan	752	.85	1,025	.82	1,418	.89	1,842	.89	2,633	1.04	3,538	1.05
Alberta	889	1.00	1,198	.96	1,571	.99	1,914	.92	2,681	1.06	3,412	1.01
British Columbia	897	1.01	1,256	1.01	1,473	.93	1,855	.89	2,459	.97	3,560	1.05
Coefficient of Variation	11.2%		20.7%		14.2%		13.4%		17.5%		8.0%	

Source: 1961 Census of Canada, Bulletin 4:1-1, Table A9.

education it was from .71-1.06. For those with some university and university degrees, the ranges were from .67-1.06, and from .84-1.06, respectively.

The corresponding coefficients of variation among the provinces in total average annual incomes of females having these six levels of education attainment were 11.2 per cent, 20.7 per cent, 14.2 per cent, 13.4 per cent, 17.5 per cent and 8.0 per cent.

When interprovincial variations in these total income figures for females shown in Table XXIII are compared with those for males presented in Table XXI, page 94, it will be noted that the coefficients of variation for the female group were smaller than those for the males in the "no schooling" and "university degree" classifications, but were greater than those for males in the other four educational level categories.

III. ANNUAL EARNINGS OF FAMILY HEADS

Tabulations of annual earnings of Canadian and provincial family heads classified by several levels of educational attainment are available from both the 1961 and 1941 Census of Canada reports. These are examined separately in the following two subsections.

1961 Data

Annual earnings of family heads classified by eight levels of educational attainment and eight age classifications for Canada and the provinces are presented in Table XXIV. Coefficients of variation in annual earnings among the provinces in each age and education

TABLE XXIV

AVERAGE EARNINGS OF FAMILY HEADS BY LEVEL OF SCHOOLING AND AGE,
FOR CANADA AND THE PROVINCES FOR THE YEAR ENDING MAY 31, 1961

Level of Education and Age	Can. $	Nfld. $	P.E.I. $	N.S. $	N.B. $	Que. $	Ont. $	Man. $	Sask. $	Alta. $	B.C. $	Coef. of Var.
All Family Heads	4,133	3,143	3,845	3,431	3,189	3,948	4,400	4,028	3,830	4,242	4,443	15.1%
No schooling	2,155	1,957	1,262	2,045	1,528	2,219	2,518	2,080	1,589	1,844	2,406	20.4
Under 25	1,855	1,320	—	950	1,700	1,608	2,100	1,890	760	1,073	2,187	33.9
25-34	2,042	1,868	975	1,660	1,350	2,056	2,407	1,900	1,272	1,844	2,241	25.5
35-44	2,144	1,978	1,838	2,332	1,585	2,249	2,528	1,896	1,339	1,898	2,310	18.3
45-54	2,154	1,975	1,365	2,040	1,553	2,245	2,532	2,179	1,821	1,687	2,524	19.5
55-64	2,326	2,110	1,131	1,964	1,579	2,406	2,692	2,311	1,863	1,996	2,586	22.9
65+	1,908	1,298	910	2,063	1,389	1,941	2,255	1,655	1,283	1,724	1,915	25.4
Elementary 1-4 years	2,603	2,136	1,554	2,147	1,885	2,639	2,877	2,494	2,218	2,482	2,982	18.8
Under 25	2,053	1,557	1,293	1,851	1,455	2,122	2,313	1,866	1,193	1,363	2,366	24.6
25-34	2,457	1,921	1,338	2,036	1,652	2,521	2,714	2,254	1,904	2,294	2,861	22.1
35-44	2,711	2,212	1,635	2,287	1,948	2,787	2,947	2,546	2,400	2,754	3,102	18.7
45-54	2,679	2,241	1,723	2,175	1,991	2,713	2,966	2,588	2,327	2,609	3,116	17.8
55-64	2,671	2,158	1,672	2,151	2,005	2,593	3,046	2,663	2,433	2,505	3,056	18.2
65+	2,088	1,598	1,098	1,855	1,397	2,076	2,356	1,885	1,519	1,918	2,312	22.3
Elementary 5-8 years	3,368	2,718	2,160	2,724	2,679	3,256	3,575	3,195	3,082	3,383	3,791	16.0
Under 25	2,627	1,876	1,674	2,094	1,999	2,621	2,799	2,490	2,495	2,782	3,054	19.0
25-34	3,302	2,591	2,183	2,669	2,556	3,157	3,527	3,182	3,157	3,495	3,761	16.8
35-44	3,518	2,917	2,449	2,877	2,841	3,428	3,720	3,326	3,215	3,570	3,929	14.2
45-54	3,503	2,879	2,218	2,853	2,833	3,389	3,718	3,293	3,150	3,418	3,974	15.9
55-64	3,440	2,789	1,995	2,738	2,735	3,267	3,652	3,335	3,207	3,250	3,762	16.9
65+	2,582	2,003	1,351	2,163	2,084	2,641	2,752	2,161	1,940	2,302	2,625	18.7

TABLE XXIV (continued)

Level of Education and Age	Can.	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Coef. of Var.
Secondary 1-2 years	3,986	3,289	2,873	3,365	3,445	3,904	4,185	3,863	3,686	3,956	4,198	11.6%
Under 25	3,083	2,297	2,334	2,692	2,609	3,088	3,188	3,019	2,897	3,114	3,283	12.3
25-34	3,920	3,172	2,988	3,388	3,317	3,773	4,111	3,809	3,698	3,989	4,179	11.2
35-44	4,194	3,564	3,063	3,562	3,665	4,135	4,394	3,972	3,871	4,147	4,388	10.8
45-54	4,211	3,581	2,963	3,414	3,664	4,114	4,464	4,113	3,895	4,135	4,389	12.1
55-64	4,115	3,647	2,737	3,350	3,715	4,021	4,402	4,075	3,948	3,963	4,162	12.5
65+	3,040	3,016	1,892	2,760	2,716	3,161	3,333	2,563	2,253	2,769	3,865	15.5
Secondary 3 years	4,464	4,152	3,480	4,025	4,225	4,407	4,615	4,449	4,231	4,436	4,491	7.6
Under 25	3,314	3,004	2,624	3,050	2,877	3,349	3,401	3,329	3,208	3,253	3,411	8.2
25-34	4,301	4,016	3,684	3,974	3,928	4,196	4,437	4,213	4,154	4,367	4,382	5.7
35-44	4,732	4,534	3,756	4,256	4,472	4,713	4,855	4,673	4,443	4,765	4,748	7.2
45-54	4,788	4,503	3,716	4,172	4,616	4,753	4,933	4,864	4,584	4,793	4,762	8.1
55-64	4,667	4,637	2,997	4,179	4,818	4,507	4,915	4,732	4,570	4,546	4,449	12.3
65+	3,468	3,304	2,041	3,405	3,315	3,815	3,747	3,000	2,519	3,049	3,110	17.1
Secondary 4-5 years	5,028	4,655	4,196	4,583	4,240	5,059	5,227	4,711	4,577	4,798	4,821	6.8
Under 25	3,576	3,231	3,141	3,367	3,086	3,595	3,681	3,436	3,468	3,418	3,601	5.9
25-34	4,704	4,373	4,228	4,473	4,022	4,653	4,856	4,468	4,479	4,631	4,607	5.3
35-44	5,356	5,043	4,695	5,045	4,846	5,414	5,503	4,988	4,970	5,222	5,116	4.8
45-54	5,527	5,029	4,153	4,738	4,739	5,493	5,767	5,212	5,029	5,380	5,231	9.0
55-64	5,325	5,481	4,299	4,512	4,540	5,386	5,596	5,123	4,753	4,903	4,917	8.9
65+	4,066	4,644	2,841	3,808	3,673	4,530	4,347	3,552	2,774	3,166	3,472	18.0

TABLE XXIV (continued)

Level of Education and Age	Can.	Nfld.	P.E.I.	N.S.	N.B.	Que.	Ont.	Man.	Sask.	Alta.	B.C.	Coef. of Var.
Some University	5,571	4,961	4,303	5,113	4,711	5,921	5,826	5,131	4,832	5,160	5,268	9.3%
Under 25	3,349	3,006	3,441	3,304	3,016	3,834	3,369	3,367	3,015	2,926	3,135	8.6
25-34	5,112	4,580	4,073	4,945	4,459	5,377	5,294	4,769	4,643	4,801	4,880	8.0
35-44	6,081	5,476	4,793	5,698	5,267	6,434	6,280	5,592	5,292	5,830	5,784	8.6
45-54	6,172	5,700	4,283	5,218	5,231	6,520	6,450	5,791	5,526	5,780	5,843	11.4
55-64	5,852	5,044	4,846	5,303	4,903	6,283	6,152	5,519	5,022	5,504	5,283	9.2
65+	4,315	4,158	3,661	3,686	3,892	4,908	4,688	3,939	3,465	3,781	3,675	11.8
University Degree	7,639	7,379	5,936	6,547	6,565	7,697	7,914	7,289	6,983	7,607	7,274	8.4
Under 25	4,016	3,794	4,740	3,432	3,549	4,263	4,057	3,887	3,444	4,020	3,871	10.2
25-34	6,424	6,377	5,136	5,708	5,690	6,432	6,621	6,049	6,097	6,606	6,036	7.7
35-44	8,231	7,707	6,341	7,070	7,090	8,365	8,449	8,005	7,488	8,463	7,725	9.0
45-54	8,712	8,577	6,169	7,300	6,925	8,749	9,042	8,392	7,988	8,603	8,407	11.5
55-64	8,537	9,066	6,453	7,286	7,597	8,634	8,783	8,484	7,862	8,191	8,182	9.7
65+	6,446	9,169	8,333	5,516	7,387	7,027	6,535	5,824	6,425	6,031	5,007	19.1

Source: 1961 Census of Canada, Bulletin 2:1-9, Table 80.

classification are also given in this table.

An examination of the data in Table XXIV suggests that the variations among the provinces in average earnings accruing to persons with similar levels of educational attainment and of similar age are very marked. The figures suggest that these variations in family head earnings are greatest for persons with no schooling, those with from one to four years of elementary education, and those with from five to eight years of elementary education, where the coefficients are in the order of twenty per cent, nineteen per cent and sixteen per cent respectively. Variations are least for persons with complete secondary school standing, as indicated by coefficients of variation for persons with four and five years of secondary schooling in the order of seven per cent. The smallest coefficient of variation, 4.8 per cent, is found for family heads aged 35-44 with four or five years of secondary education. The variations for persons in the "some university" and "university degree" classifications were greater than for the "three year secondary" and "four and five year secondary" classifications.

In most of the educational level classifications, the amount of variation was least for persons in the 35-44 age categories, and greatest for the oldest and youngest family heads. For example, in the "five to eight year elementary" classification, the coefficient of variation for the 35-44 age category was 14.2 per cent, whereas the values for the under 25 age group and over 65 age group were 19.0 and 18.7 respectively. The variations for both the 25-34 and the 55-64 age groups were intermediate between these two, while the variation for the 45-54 age group

was closer to the minimum value. This same pattern is found in most of the educational level classifications. However, in the "three years secondary," "some university," and "university degree" classifications, the least variations were found for the 25-34 age group.

There is no method of determining which variations are significantly large and those which are not. In fact, the problem of determining an acceptable level of interprovincial income disparities may not be dissimilar to the problem of defining an acceptable level of unemployment in a country. In the latter case, certain factors such as persons moving from job to job, or factories changing industrial processes, make a certain level of unemployment inevitable.[10] In addition, some have argued that a condition of full employment with its attendant inflationary tendencies is in some respects unsatisfactory.[11] Thus, some economists have suggested that unemployment rates of three, four or five per cent may be acceptable.[12]

It was noted in Table XIX[13] that the coefficient of variation among the Canadian provinces in 1961 earned income per employed person was 17.2 per cent. It is known that this amount of variation is sufficient to cause serious problems in income disparities among the Canadian provinces. A comparison between this 17.2 per cent variation and the coefficients of variation in Table XXIV indicates that interprovincial variations in 1961 earnings of family heads with 5-8 years of elementary schooling or less are equal to or greater than interprovincial variations in 1961 earned income per employed person; variations for persons with 1-2 years secondary schooling are slightly less than this value, while

the variations for family heads with three years of secondary schooling or more are generally substantially lower than this value.

1941 Data

Tabulations of annual earnings of family heads in Canada and the provinces during the year ending May 31, 1941 are presented in Table XXV. Average values are presented for all family heads, and for those in five educational level classifications. No subclassifications are provided in the 1941 census for persons with secondary schooling or those with university education.

The coefficients of variation, shown in Table XXV, indicate that variations among the nine provinces were greatest for persons with no schooling, 1-4 years elementary schooling, and 5-8 years elementary schooling, at 22.8 per cent, 24.1 per cent and 17.6 per cent respectively. Variations were least for persons with secondary schooling, and only slightly higher for family heads having thirteen or more years of education.

Thus, both 1961 and 1941 data suggest that interprovincial differences in average earnings of persons with no schooling, and with elementary education are very substantial, while the variations among the provinces in average earnings of persons with secondary schooling and university education are much less.

TABLE XXV

AVERAGE ANNUAL EARNINGS OF FAMILY HEADS WITH FIVE LEVELS OF
EDUCATIONAL ATTAINMENT FOR THE YEAR ENDING MAY 31, 1941 –
CANADA AND THE PROVINCES

	All Family Heads	Years of Schooling				
Province		0	1-4	5-8	9-12	13+
Canada	1,245	763	786	1,054	1,459	2,129
Prince Edward Island	806	401	379	612	1,114	1,764
Nova Scotia	1,055	734	740	906	1,271	2,016
New Brunswick	947	501	578	845	1,308	1,969
Quebec	1,152	675	749	973	1,460	2,198
Ontario	1,364	849	931	1,163	1,512	2,209
Manitoba	1,258	637	704	1,039	1,493	2,119
Saskatchewan	1,086	470	584	889	1,328	1,700
Alberta	1,228	643	782	1,013	1,390	1,806
British Columbia	1,308	715	887	1,138	1,422	1,920
Coefficient of Variation	15.9%	22.8%	24.1%	17.6%	9.2%	9.5%

Source: 1941 Census of Canada, Volume 5, Table 26.

IV. SUMMARY

The purpose of this chapter was to determine if the education-earnings relationship that was demonstrated to exist in Canada was relatively constant throughout the country, or whether significant differences existed among the provinces in average earnings associated with specific levels of schooling.

Two sets of data from the 1961 census and one set of figures from the 1941 census indicated that average incomes of persons having similar educational attainments varied substantially among the Canadian provinces. Differences appeared to be greatest for persons with little schooling, and least for those possessing higher educational qualifications.

The extent of interprovincial differences in average income levels was determined by using coefficients of variation calculated from provincial average figures. In 1961, coefficients of variation in average annual earnings of family heads varied from 20.4 per cent for those with no schooling, 18.8 per cent for those with 1-4 years elementary schooling, 16.0 per cent for those having 5-8 years of elementary education. For those having secondary education, the coefficients of variation were 11.6 per cent, 7.6 per cent and 6.8 per cent, in the cases of those having one or two, three, and four or five years of secondary schooling respectively. For those with some university education the coefficient of variation in average annual earnings of family heads was 9.3 per cent, while the corresponding coefficient for

those having university degrees was 8.4 per cent.

Essentially similar findings were obtained with both 1961 census figures relating total annual incomes of males having six levels of educational attainment, and with family head earnings available from the 1941 census.

Substantial interprovincial variations in average incomes of females were also noted.

FOOTNOTES FOR CHAPTER V

[1]Gordon W. Bertram, The Contribution of Education to Economic Growth (Ottawa: The Economic Council of Canada, Staff Study No. 12, June, 1966), p. 48.

[2]J. R. Podoluk, Earnings and Education (Ottawa: Dominion Bureau of Statistics, December, 1965), p. 59.

[3]Department of Labour, Wage Rates, Salaries and Hours of Labour (Ottawa: Economics and Research Branch, Report No. 48, 1966).

[4]Ibid., Table 12, pp. 58-60.

[5]In the Podoluk study the index of dispersion was defined as the interquartile range divided by the median. Vide: Podoluk, op. cit., p. 33.

[6]Ibid., pp. 34-37.

[7]Isabel B. Anderson, Internal Migration in Canada, 1921-61 (Ottawa: The Economic Council of Canada, Staff Study No. 13, March, 1966).

[8]1961 Census of Canada, "Population Sample. Incomes of Individuals" (Ottawa: Dominion Bureau of Statistics, 1965. Bulletin 4:1-2).

[9]1961 Census of Canada, "Households and Families (Ottawa: Dominion Bureau of Statistics, 1964. Bulletin 2:1-9).

[10]Alfred Stonier and Douglas C. Hague, A Textbook of Economic Theory (third edition; London: Longmans, Green and Company, 1964), p. 384.

[11]Vide: John Lindauer, Macroeconomics (New York: John Wiley and Sons, 1968), pp. 262-64, for a discussion of the "cost-push dilemma."

[12]Vide: Barry N. Siegel, Aggregate Economics and Public Policy (Homewood, Ill.: Richard D. Irwin Inc., 1965), pp. 316-22, for a discussion of the various definitions of "full employment."

[12]Vide supra, p. 82.

CHAPTER VI

INTERPROVINCIAL COMPARISONS OF LIFETIME EARNINGS ASSOCIATED WITH

EIGHT LEVELS OF EDUCATIONAL ATTAINMENT

I. INTRODUCTION

In the preceding chapter, Canadian interprovincial differences
in average annual earnings associated with several levels of educational
attainment and specific age classifications were examined, using data
relating to individual income and earnings in 1961 and 1941. In this
chapter, interprovincial differences in average lifetime earnings
associated with eight levels of educational attainment are examined.
The data employed in this chapter refer to earnings from employment of
provincial family heads valid in 1961. One advantage of estimating
lifetime earnings is that this method permits the incorporation of
earnings data for several age classifications into one set of estimates.
It was found in the preceding chapter that interprovincial income
differentials associated with specific levels of schooling varied con-
siderably with the age of the household head. These variations are
incorporated into the estimates of lifetime earnings thus providing a
single measure from which interprovincial income differentials may be
determined for each educational level category.

A number of assumptions must be made when estimates of lifetime
earnings are calculated. These are detailed in the sections that follow.
One basic assumption is that the conditions which were present when the

data used in the calculations were collected would also be present
during the entire working careers of the populations considered. This
assumption suggests that income differentials present during the year
the data were collected remain constant during a man's lifetime. This
method ignores the real growth that has occurred in personal income in
Canada during recent decades,[1] and the possibility that income differen-
tials among the provinces in Canada may be tending slightly towards
convergence.[2]

Before the estimates of lifetime earnings are presented, age-
earning profiles of persons having differing levels of educational
attainment will be briefly examined.

II. AGE-EARNING PROFILES

One method of comparing earnings of persons who have differing
amounts of schooling is to compare graphs showing average earnings
associated with various levels of educational attainment throughout the
life-work span--the years during which people are engaged in productive
employment--of the individuals concerned.

Gary S. Becker, in discussing the theoretical relationship
between education, age and earnings, suggested that earnings during
an individual's lifetime will tend to reflect the investment value of
the education and training which he has received. According to Becker's
reasoning, a person with little education and training will have invested
little in himself, and hence his annual earnings will tend to be low and
to be roughly equal during his working career. A person with a good

deal of education and training, on the other hand, will have invested a

great deal of time and money in attaining increased knowledge and

skills. During his early working years, such a person will receive low

earnings, because the cost of continued education and training are paid

for during this time. But in later years, earnings rise rapidly until

they level out, because of the large investment that had been made

earlier. The greater the training, the steeper the slope of the earn-

ings curve, and the higher the earnings after levelling off. The age-

earning graph, or profile, of a person with little education will tend

to be a horizontal line throughout his working years. The profile for

a person with several years of schooling will tend to be low during his

early working years, then rise rapidly and level off in a typical "S"

curve. The slope of the curve and the height of the final portion of

it will depend upon the amount of education and training an individual

has received.[3]

An example of an age-earning profile is given in Figure 1, and

applies to averages for family heads in Canada in 1961. This figure

presents the graphs of average earnings during their life-work span,

of family heads having eight levels of educational attainment, based

upon 1961 Census of Canada reports of earnings from employment of family

heads. Total and incremental annual earnings associated with any

specific age group and level of schooling may be estimated directly

from such graphs, and estimates of lifetime earnings may also be ob-

tained by determining areas under the graphs.[4]

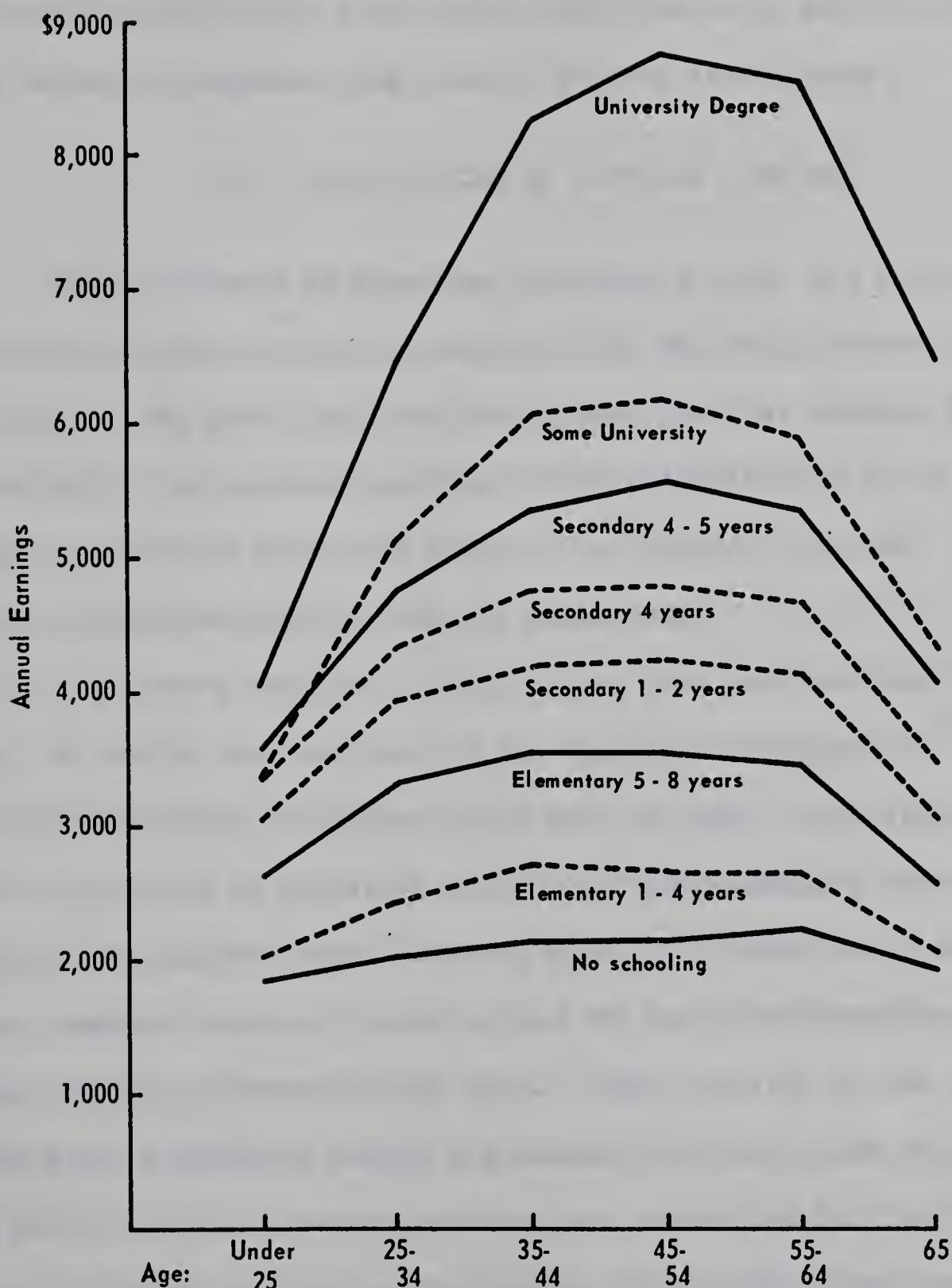The age-earning profiles generally follow the shapes suggested

FIGURE I

AGE-EARNING PROFILES FOR CANADIAN FAMILY HEADS HAVING
EIGHT LEVELS OF EDUCATIONAL ATTAINMENT, 1961

by Becker. Earnings over the lifetimes of individuals with little schooling tend to be low, with little indication of change over the years. The concavity and height of the earnings curves increase with increased schooling. The substantial incremental earnings accruing to individuals with higher educational qualifications, particularly those with university degrees, are clearly evident from Figure 1.

III. CALCULATIONS OF LIFETIME EARNINGS

While it would be possible to estimate total and incremental lifetime earnings accruing to persons with differing levels of schooling for each of the provinces from age-earning profiles similar to the one presented in the previous section, their determination would be rather complex because of the great amount of arithmetic involved. In this section completed calculations are presented.

The method employed in calculating lifetime earnings in this study is similar to that used in the Podoluk investigation.[5] A cohort of 100,000 persons is assumed to be born in 1961. They achieve a particular level of education and the surviving members enter the labour force at the assumed school leaving age. Attrition occurs among the cohort members because of deaths, and the survivors earn the average wages shown in cross-sectional data. Total earnings of the cohort members are calculated during the assumed life-work span of the group, and the individual lifetime earnings are determined by dividing the total cohort lifetime earnings by the number of original cohort members who began their work career following schooling.

For the section, the following assumptions are made:

1. The <u>Canada</u> <u>Life</u> <u>Tables</u>, 1960-62[6] apply in each of the provinces.

2. Persons with varying levels of education enter the work force in each province at the following ages:

No schooling - age 15.

Partial or complete elementary schooling - age 15.

One or two years secondary schooling - age 16.

Three years secondary schooling - age 17.

Four or five years secondary schooling - age 19.

Completed some university - age 21.

Completed university degree - age 23.

3. The normal life-work span ends at age 64.

4. Life expectancy is not related to the educational level of individuals.

5. No interruptions occur in the life-work span of individuals due to unemployment, illness or other factors except death.

An example of the method used in this study to estimate life-time earnings using cross-sectional data and life tables by age for the eight educational level groups in each of the provinces is provided below in the calculation of the lifetime earnings of persons with five to eight years of elementary schooling for the province of Newfoundland. The following procedure is used:

1. Of the 100,000 male children born in 1961, 95,903 would expect to survive to age 15. It is assumed that all of these enter the

labour force and that the surviving members work until the end of their

sixty-fourth year.

2. Between the ages of fifteen and twenty-four, the survivors

will live a total of 953,746 man-years, and earn an average of $1,876

per year (from Table XXIV, page 102). Their total aggregate earnings

for this period will be $1,789.2 million.

3. Between ages twenty-five and thirty-four, the number of man-

years lived is 939,329, and average annual earnings are $2,591, for an

aggregate of 2,433.8 million.

4. Between the ages of thirty-five and forty-four, the number

of man-years is 920,559, and the average annual earnings are $2,917,

and aggregate earnings are $2,685.9 million.

6. For the 55-64 age group, average earnings are $2,789, for a

total of 778,644 man-years, and an aggregate of $2,171.6 million.

7. The average lifetime earnings for Newfoundlanders with

five to eight years of elementary schooling is found by dividing the

total aggregate earnings, $11,612.8 million, by the original number of

males who entered the labour force in this group (95,903), to obtain

the figure $121,089.

Similar calculations were made for family heads with the seven

other levels of schooling for Newfoundland, for each of the other

provinces, and for Canada. The estimates of lifetime earnings for

each province and for Canada of family heads with eight levels of

educational attainment are presented in Table XXVI. As in previous

tables, coefficients of variation, expressed in per cent, are given to

TABLE XXVI

TOTAL UNDISCOUNTED LIFETIME EARNINGS ASSOCIATED WITH EIGHT LEVELS OF SCHOOLING – CANADA AND THE PROVINCES, 1961

Province	No Schooling	Elementary		Secondary			University	
		1-4	5-8	1-2	3	4-5	Some	Degree
Canada	97,673	116,767	152,301	178,427	196,077	214,637	227,539	302,298
Newfoundland	85,659	93,611	121,089	148,417	186,044	201,984	204,063	299,394
Prince Edward Island	--	71,039	98,082	131,498	151,703	179,405	179,478	232,980
Nova Scotia	82,750	97,719	122,984	150,105	176,556	193,690	208,664	259,422
New Brunswick	72,410	83,892	120,379	154,917	186,084	185,420	195,400	259,710
Quebec	97,848	118,488	147,506	174,810	193,519	214,568	242,205	305,309
Ontario	113,810	129,812	161,847	187,817	202,637	221,599	236,323	311,513
Manitoba	94,357	110,435	145,141	173,409	195,993	202,741	213,215	293,701
Saskatchewan	64,701	94,651	141,529	167,224	188,347	197,804	201,153	278,458
Alberta	78,362	106,731	151,807	176,997	195,618	205,887	213,848	302,508
British Columbia	110,022	134,724	171,923	186,637	195,786	204,464	213,792	287,517
Coefficient of Variation	18.6%	19.2%	16.7%	11.1%	7.7%	6.3%	8.7%	8.9%

Source: Table XXIV, pages 102-104.

indicate the extent of variation among the provinces in lifetime

earnings associated with the eight levels of educational attainment.

Interprovincial Comparisons

Interprovincial comparisons of lifetime earnings associated with

eight levels of educational attainment are discussed in the sections

that follow. The variations in lifetime earnings are related to

figures previously presented showing the number of male adults in each

of the educational level categories in each province, to indicate the

extent to which interprovincial variations affect total interprovincial

income disparities.

No schooling. Because all the necessary data were not available,

it was not possible to estimate lifetime earnings for persons with no

schooling in Prince Edward Island. For the other nine provinces, life-

time earnings for persons with no schooling were estimated to vary

from $72,410 in New Brunswick to $113,810 in Ontario.

The coefficient of variation in lifetime earnings for persons

in this educational classification was calculated to be 18.6 per cent

among the nine provinces. This large variation affected only a small

proportion of Canadian wage earners, however. Table V (page 47) points

out that only 1.2 per cent of Canadian males aged 20-64 had no schooling

in 1961.

One to four years elementary schooling. Lifetime earnings of

household heads with from one to four years of formal schooling varied

from $71,039 in Prince Edward Island to $134,724 in British Columbia,

with the Canadian average equal to $116,767. The coefficient of varia-
tion among the ten provinces was again large, at 19.2 per cent. Persons
in this group comprised 7.9 per cent of Canadian adult males in 1961.
There were, however, in some provinces relatively very large proportions
of persons in this educational level category. In Newfoundland this
group made up 22.5 per cent of the males aged 20-64; in New Brunswick
the percentage was 12.7, and in Quebec, 12.8. In both Newfoundland and
New Brunswick the average lifetime earnings of persons with one to four
years of elementary schooling were considerably less than the Canadian
average. Hence, a substantial part of the lower-than-average provincial
incomes in these two provinces can be accounted for both by the large
number of family wage earners in this group and by the low average
incomes associated with this educational level category in relation to
the other provinces in Canada.

Five to eight years of elementary schooling. The largest number
of Canadian adult males, 39.1 per cent, were in this educational level
classification in 1961. Prince Edward Island, New Brunswick, Quebec
and Saskatchewan, with 47.3, 46.0, 41.9 and 43.5 per cent respectively,
had larger proportions than the Canadian average in this category.
Lifetime earnings for this group varied from $98,082 in Prince Edward
Island to $171,923 in British Columbia. The Canadian average was
$152,301, and the coefficient of variation was 16.7 per cent.

Because of the large number of Canadian wage earners in this
educational level category, and the great variations among the provinces

in earnings accruing to persons with this level of schooling, a large part of the interprovincial income differentials in Canada may be accounted for by differences among the provinces in this classification.

One to two years secondary schooling. Lifetime earnings for persons with one to two years of secondary education varied from $131,498 in Prince Edward Island to $187,817 in Ontario. The Canadian average for this educational level classification was $178,427. The coefficient of variation in average provincial lifetime earnings for persons with this level of educational attainment was 11.1 per cent. Just over one-fifth, 20.8 per cent, of Canadian adult males in 1961 had this amount of schooling. All four of the Maritime provinces had substantial proportions of the populations with this level of schooling, and average earnings for this classification were all well below the Canadian average for these provinces.

Three years secondary schooling. Lifetime earnings for household heads with three years of secondary schooling varied from $151,703 in Prince Edward Island to $202,637 in Ontario. The coefficient of variation among the provinces for this classification was 7.7 per cent. This group comprised 8.1 per cent of Canadian adult males in 1961.

Four and five years secondary schooling. Persons having four and five years of secondary education made up 14.2 per cent of males aged 20-64 in Canada in 1961. The percentage varied considerably among the provinces, with British Columbia and Ontario having 20.3 and 16.7 per cent respectively, while the corresponding figures for Newfoundland and Prince Edward Island were only 2.4 and 3.1 per cent. Lifetime earnings of household heads with this level of schooling varied from $179,405 in

Prince Edward Island to $221,599 in Ontario. The variation amongst the provinces in lifetime earnings was least for persons with this level of educational attainment. The coefficient of variation was only 6.3 per cent.

Some university. Persons who had attended university but had not attained a degree made up only 3.6 per cent of adult Canadian males in 1961. Average lifetime earnings of household heads with some university training was $227,539; the smallest value was for Prince Edward Island, at $179,478, while the largest was for Quebec, at $242,205. The coefficient of variation for this educational classification was 8.7 per cent.

University degree. Average lifetime earnings for household heads having university degrees varied from $232,980 in Prince Edward Island to $311,513 in Ontario, with the Canadian average equal to $302,298. The coefficient of variation among the provinces was 8.9 per cent. The percentage of adult Canadians with university degrees in 1961 was 5.1.

IV. INCREMENTAL LIFETIME EARNINGS ASSOCIATED WITH
INCREASED SCHOOLING

Expenditures for education are considered to have both a consumption and an investment component. When considered as an investment good, educational expenditures may be thought of as a current outlay made because of their promise of future financial returns.

When economists discuss the behaviour of human beings either as

consumers or investors, it is assumed that people behave in a rational

manner.[7] As investors, people are assumed to expend their scarce

resources, which may be in the form of money, time or other productive

factors, in such a way that they will achieve maximum profit for them-

selves.

While it is not within the scope of this study to examine

differences among the Canadian provinces in expenditures for schooling,

this investigation is concerned with interprovincial differences in

monetary returns accruing to persons with varying levels of educational

attainment. An examination of differences among the provinces in the

marginal, or incremental, returns to increased schooling will provide

an indication of interprovincial differences in the investment value of

education, and a comparison between these values and provincial school

enrolment data will provide an indication of whether or not provincial

populations are behaving "rationally" as "investors in human capital."

Table XXVII shows the incremental lifetime earnings associated

with seven levels of educational attainment for household heads in

Canada and the provinces, based on 1961 data on annual earnings.

According to this table, a person in Quebec who had from one to four

years of elementary schooling could expect to earn during his lifetime

$20,640 more than a person who had no schooling. Similarly, a person

in Alberta who had completed a university degree would earn on the

average $88,660 more during his lifetime than one who had attended

university but had left prior to graduation. Marginal values in life-

time earnings for each of the seven other levels of schooling in each

TABLE XXVII

INCREMENTAL LIFETIME EARNINGS ASSOCIATED WITH INCREASED SCHOOLING
IN CANADA AND THE PROVINCES, 1961

Province	Elementary		Secondary			University	
	1-4	5-8	1-2	3	4-5	Some	Degree
Canada	19,094	35,534	26,126	17,650	17,650	12,902	74,559
Newfoundland	7,952	27,478	27,328	37,627	15,940	2,079	95,331
Prince Edward Island	--	27,043	33,416	20,205	27,702	73	53,502
Nova Scotia	14,969	26,265	27,121	26,461	17,134	14,974	50,758
New Brunswick	11,482	36,487	34,538	31,167	-664	9,980	64,310
Quebec	20,640	29,018	27,304	18,709	21,049	27,637	63,104
Ontario	16,002	32,035	25,970	14,820	18,962	14,724	75,190
Manitoba	17,078	33,706	28,268	22,584	6,749	10,474	80,486
Saskatchewan	29,950	46,878	25,695	21,123	9,457	3,349	77,305
Alberta	28,369	45,076	25,190	18,621	10,269	7,961	88,660
British Columbia	24,702	37,199	14,714	9,149	8,678	9,328	73,725

Source: Table XXVI, page 119.

province and Canada are shown in this table.

In Table XXVIII, total incremental earnings accruing to household
heads who have completed elementary schooling, secondary schooling, and
university degrees are shown for Canada and the provinces. The figures
in Table XXVIII were obtained by combining the appropriate figures from
Table XXVII. Thus a person in British Columbia who had completed his
elementary education could expect $61,901 more in lifetime earnings than
a person with no schooling; if he had completed his secondary education
his lifetime earnings would be $32,541 more than if he had stopped
school at the end of the elementary grades. If he had gone on to com-
plete a university degree his lifetime earnings would have been in-
creased by $83,053.

The figures in Table XXVIII provide an indication of the finan-
cial benefits of increased schooling accruing to the provincial popula-
tions of Canada. According to Table XXVIII, secondary schooling pro-
vided the greatest incremental returns in lifetime earnings to indivi-
duals in Newfoundland and Prince Edward Island, and least returns to
Albertans and British Columbians. Hence, if provincial secondary
school enrolments were to reflect the economic benefits accruing to
increased schooling, it would be anticipated that the percentage of
persons of secondary school age who were enrolled in school in 1961 would
be greatest in Newfoundland and Prince Edward Island and least in
British Columbia and Alberta. However, as was noted in Table XII
(page 63), actual enrolment ratios in the provinces were almost exactly
opposite to these expectations. British Columbia and Alberta had the

TABLE XXVIII

MARGINAL LIFETIME EARNINGS ASSOCIATED WITH THREE LEVELS OF
SCHOOLING FOR FAMILY HEADS IN CANADA AND
THE PROVINCES, 1961

	Elementary Schooling	Secondary Schooling	University Degree
Canada	$54,628	$62,336	$87,661
Newfoundland	35,430	80,895	97,410
Prince Edward Island	--	81,323	53,575
Nova Scotia	40,234	70,706	65,732
New Brunswick	47,969	65,041	74,290
Quebec	49,658	67,062	90,741
Ontario	48,037	59,752	89,914
Manitoba	50,784	57,600	90,960
Saskatchewan	76,828	56,275	80,654
Alberta	73,445	54,080	96,621
British Columbia	61,901	32,541	83,053

Source: Table XXVII, page 125.

highest percentages of 15-19 year olds enrolled in school, at 68.0 and 65.8 per cent respectively, while Newfoundland and Prince Edward Island stood ninth and eighth in Canada in this regard, with enrolment percentages for this age group of 51.7 and 55.5 respectively.

The extent of differences among the Canadian provinces in incremental earnings accruing to individuals having secondary education and percentage of enrolments of 15-19 year olds in school in 1961 is shown in the rankings in Table XXIX. Spearman rank order correlation coefficients were calculated for these two sets of data, and the value of -0.879 was obtained, significant at the .01 level of confidence.

Incremental lifetime earnings accruing to persons with university degrees show much less irregularity with university enrolment expectations. When provinces are ranked in terms of incremental returns to persons with university education, and in terms of enrolments of the 20-24 age group in school, the rankings are shown in Table XXX.

The Spearman rank order correlation coefficient between these two sets of data is +0.20, which is not statistically significant.

It would appear that a tentative conclusion to be derived from these figures is that provincial populations do not behave in a rational manner, in the economic sense, in the amount of schooling they receive, particularly with respect to secondary schooling.[8] The provinces in which the future economic benefits were likely to have been greatest by an increase in attendance at the secondary school level were those which had the lowest secondary school enrolments in 1961, while the provinces whose populations would appear to benefit least, in terms of average

TABLE XXIX

SPEARMAN RANK ORDER CORRELATION COEFFICIENTS CALCULATED FOR RANK
ORDERING OF PROVINCES BY INCREMENTAL EARNINGS ASSOCIATED
WITH SECONDARY EDUCATION AND BY PERCENTAGE OF
SECONDARY SCHOOL ENROLMENTS, 1961

Province	Incremental Earnings Rank	Enrolment Percentage of 15-19 Year Olds Rank
Newfoundland	2	9
Prince Edward Island	1	8
Nova Scotia	3	6
New Brunswick	5	7
Quebec	4	10
Ontario	6	4
Manitoba	7	5
Saskatchewan	8	3
Alberta	9	2
British Columbia	10	1
Spearman ρ		-0.879[a]

[a]Indicates significance at the .01 level of confidence (.746 required for significance).

Source: Table XII, page 63, and Table XXVIII, page 125.

TABLE XXX

SPEARMAN RANK ORDER CORRELATION COEFFICIENT CALCULATED FOR RANK
ORDERING OF PROVINCES BY INCREMENTAL EARNINGS ASSOCIATED
WITH UNIVERSITY EDUCATION AND BY PERCENTAGE OF
THE 20-24 AGE GROUP IN ATTENDANCE
AT SCHOOL, 1961

Province	Incremental Earnings Rank	Enrolment Percentage of 20-24 Year Olds Rank
Newfoundland	1	10
Prince Edward Island	10	8
Nova Scotia	9	9
New Brunswick	8	7
Quebec	4	6
Ontario	5	2
Manitoba	3	3
Saskatchewan	7	5
Alberta	2	4
British Columbia	6	1
Spearman ρ		+0.20[a]

[a]Not statistically significant.

Source: Table XII, page 63, and Table XXVIII, page 125.

incremental lifetime earnings, had the largest secondary school enrol-
ments in that year. This anomalous situation was not present to the
same extent in the case of university level enrolments. However, the
low degree of correlation between benefits in the form of incremental
lifetime earnings accruing to persons with university education, and
enrolments of persons in the 20-24 age groups among the provinces,
suggests that there was only a slight positive relationship between
marginal benefits and optimal enrolments of persons of this age.

V. SUMMARY

The purpose of this chapter was to determine Canadian inter-
provincial differences in lifetime earnings accruing to individuals with
specific levels of educational attainment. Earnings data employed
referred to earnings from employment of family heads during the year
preceding May 31, 1961. An age-earning profile showing average earn-
ings accruing to Canadian household heads with eight levels of education-
al attainment was presented. Estimates of total and marginal lifetime
earnings accruing to provincial family heads having these same eight
levels of schooling were calculated, and interprovincial comparisons were
made.

Differences among the provinces in lifetime earnings were
greatest for persons with either no schooling or with only elementary
school education, and least for those having three, four or five years
of secondary schooling. A comparison between lifetime earnings and
educational levels of provincial populations suggested that Canadian

interprovincial income disparities can be explained to a considerable extent by two factors: differences among the provinces in the number of wage earners with higher educational qualifications, and interprovincial differences in the education-earnings relationship.

Substantial differences were found among the provinces in incremental earnings associated with increased education. Secondary school enrolments in the Canadian provinces appeared to be exactly opposite to marginal earnings expectations. In those provinces where marginal lifetime earnings were calculated to be greatest, actual enrolments of students of secondary school age were the smallest in Canada in 1961, while provinces with the largest secondary school enrolments promised the least in marginal lifetime earnings.

Enrolments of persons of university age tended only slightly to reflect potential marginal lifetime earnings among the Canadian provinces.

FOOTNOTES FOR CHAPTER VI

[1] Regarding productivity increases of Canadian wage earners, T. R. Vout noted, "Real output per wage earner per hour of work indicate an overall improvement of 261 per cent for the period 1900-1957-- yielding an annual average increase of 2.28 per cent (compound)." Vide: T. R. Vout, "The Canadian Manufacturing Industry, 1900-1957," in: E. F. Beach and J. C. Weldon (eds.). Papers. Canadian Political Science Association, Conference on Statistics, 1960 (Toronto: University of Toronto Press, 1962), p. 310.

[2] As noted in Table XIX, page 82, during the decade 1951-61.

[3] Gary S. Becker, Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (New York: National Bureau of Economic Research, 1964), pp. 14-16 and pp. 138-44.

[4] It should be pointed out that age-earning profiles, such as those presented in Figure 1, may give incorrect impressions of actual changes in average earnings over the life span of the persons considered. Average earnings over several five- or ten-year periods are determined from cross-sectional data and these average earnings are graphed as fixed points, which are then joined to make up the profile. Average earnings over a time period are, therefore, correctly represented by these fixed points, rather than by the lines which join the points.

[5] J. R. Podoluk, Earnings and Education (Ottawa: Dominion Bureau of Statistics, December, 1964).

[6] Canada Life Tables 1960-1962 (Ottawa: The Dominion Bureau of Statistics, December, 1963).

[7] Vide: Alfred W. Stonier and Douglas C. Hague, A Textbook of Economic Theory (third edition; London: Longmans, Green and Company, 1964), p. 2 and pp. 102-104.

[8] This must remain a tentative finding until further research is undertaken. Costs as well as returns must be considered in judging the efficacy of investment decisions, and this study has not examined interprovincial differences in educational costs.

CHAPTER VII

THE RELATIVE SIGNIFICANCE OF DIFFERENCES IN POPULATION EDUCATIONAL

LEVELS IN ACCOUNTING FOR CANADIAN REGIONAL INCOME DISPARITIES

I. INTRODUCTION

The previous chapters have demonstrated that very substantial

differences exist in average income levels of Canadian provincial popu-

lations and that these differences in income are closely related to

differences in average levels of educational attainment of the adult

male populations concerned. It has been shown as well that substan-

tial differences exist among the provinces in average incomes accruing

to persons having similar levels of schooling. In this chapter further

evidence concerning the significance of differences in population

educational levels in their relationship to differences in income levels

is examined.

In the first section of the chapter a brief examination is made

of a number of factors including education which have been cited by

economists as being related to Canadian interprovincial income dis-

parities. The purpose of this examination is to attempt to determine

through correlational analysis the relative importance of the selected

factors in accounting for average income differentials among the

provinces. While it is not possible with the use of this form of

statistical analysis to determine cause and effect relationships, the

method does permit the drawing of certain inferences concerning the

relative significance of the factors that are employed. Most of the factors selected for examination in this section are suggested in the Second Annual Review of the Economic Council of Canada as being associated with Canadian regional income disparities.[1]

In the second section of this chapter certain statistics descriptive of Canadian metropolitan areas are examined, principally to serve as a check on findings derived from provincial data. The fact that there are only ten Canadian provinces raises some questions concerning the validity of correlational relationships found with an N of ten and only eight degrees of freedom, despite the high coefficients that are required for significance. The statistics used in this part are taken from the 1961 Census of Canada, "Population and Housing Characteristics by Census Tracts" bulletins,[2] which include data on twenty-three Canadian metropolitan areas. The larger number of units, twenty-three compared to ten, and the consequent increase in the number of degrees of freedom, twenty-one as compared to eight, tend to increase the credibility of statistical relationships that are found.

The final section of the chapter examines the statistical relationship between the relative concentrations within provinces of persons having eight specific levels of educational attainment and the average incomes within provinces associated with the same eight levels of schooling. It was sought to determine in this section whether changes in the number of individuals having particular levels of educational attainment within provinces tend to affect the size of annual earnings received by these people.

II.   THE RELATIONSHIPS BETWEEN AVERAGE PROVINCIAL INCOME LEVELS

AND INTERPROVINCIAL DIFFERENCES IN SELECTED FACTORS

In this section the statistical relationship between two 1961 average provincial income measures and twelve factors alleged to be associated with Canadian interprovincial income disparities are determined.   Four groups of factors are examined: differences among the provinces in certain demographic characteristics, in the structure of economic activities, in provincial capital inputs, and in population educational levels.   An indication of the relative importance of the twelve factors in explaining Canadian regional income disparities is given by comparisons among the correlational coefficients found.

The Dependent Variables

Two dependent variables, labelled here $X1$ and $X2$ respectively, were selected: $\overline{1961}$ personal income per capita, and $\overline{1961}$ earned income per employed person.   These values for Canada and the provinces are presented in Table XXXI.

The Independent Variables

Twelve independent variables selected from factors often considered to be associated with Canadian interregional income disparities were related to the two dependent variables listed above. These are delineated in the following subsections.

Demographic factors.   Four factors descriptive of provincial populations to be related to the two dependent variables were selected

TABLE XXXI

PERSONAL INCOME PER CAPITA, 1961 AND EARNED INCOME PER
EMPLOYED PERSON, 1961 - CANADA AND THE PROVINCES

Province	Personal Income per Capita 1961 X1	Earned Income per Employed Person 1961 X2
Newfoundland	$ 924	$3,044
Prince Edward Island	1,000	2,258
Nova Scotia	1,205	3,039
New Brunswick	1,074	2,870
Quebec	1,382	3,382
Ontario	1,860	3,971
Manitoba	1,581	3,489
Alberta	1,617	3,670
British Columbia	1,828	4,267
Canada	1,589	3,678

Source: Tables XV, page 75 and XVII, page 77.

for consideration: total population,[3] per cent of total population

living in urban areas,[4] per cent of total population aged twenty to

sixty-four, and per cent of total population living on farms. These

were labelled Y1, Y2, Y3, and Y4 respectively. 1961 values for these

are presented in Table XXXII.

Factors descriptive of provincial structure of economic activity.

The relative significance of the three major industrial sectors:

primary,[5] secondary,[6] and service,[7] as they affect the degree of inter-

provincial income disparities were examined. The 1961 percentage dis-

tributions of employed persons in each province engaged in the primary,

secondary and service industries, labelled Y5, Y6, and Y7, respectively,

are presented in Table XXXIII.

Factors descriptive of provincial capital inputs. Three measures

of the extent of capital investment in the provinces were examined:

average annual investment during the period 1951-64, the capital stock

of machinery and equipment per capita in all industries in 1964, and

capital stock of machinery and equipment per capita in manufacturing

industries in 1964. Indexes of these values based on constant 1957

dollars are presented in Table XXXIV. These three measures are labelled

Y8, Y9, and Y10 respectively.

Educational factors. Two measures of the level of educational

attainment of adult provincial populations were examined: percentage

of the male and of the female adults of working age having more than

TABLE XXXII

DIFFERENCES AMONG THE CANADIAN PROVINCES IN FOUR
DEMOGRAPHIC FACTORS - 1961

Province	Total Population '000 Y1	Per cent of Total Population:		
		Living in Urban Areas Y2	Aged 20-64 Y3	Living on Farms Y4
Newfoundland	458	50.7	42.0	2.0
Prince Edward Island	105	32.4	44.9	33.0
Nova Scotia	737	54.3	48.3	7.7
New Brunswick	598	46.5	45.8	10.4
Quebec	5,259	74.3	50.7	10.7
Ontario	6,236	77.3	53.5	8.1
Manitoba	922	63.9	51.0	18.6
Saskatchewan	925	43.0	48.4	32.9
Alberta	1,332	63.3	49.9	21.5
British Columbia	1,629	72.6	51.8	4.8
Canada	18,201	69.6	51.0	11.4

Sources: 1961 Census of Canada, Bulletins 7:1-2, 7:1-4, 1:1-7.

TABLE XXXIII

DISTRIBUTION OF THE MALE LABOUR FORCE AMONG THREE INDUSTRIAL
SECTORS – 1961, CANADA AND THE PROVINCES

Province	Per cent of Employed Persons Engaged in:		
	Primary Industry Y5	Secondary Industry Y6	Service Industry Y7
Newfoundland	17.9	18.3	63.8
Prince Edward Island	33.9	14.9	51.2
Nova Scotia	14.4	20.4	65.2
New Brunswick	15.2	21.8	63.0
Quebec	11.3	33.2	55.5
Ontario	9.7	33.0	57.3
Manitoba	19.9	19.4	60.7
Saskatchewan	38.9	9.7	51.4
Alberta	25.7	15.9	58.4
British Columbia	9.0	25.4	64.8
Canada	14.0	28.0	58.0

Source: Economic Council of Canada, Towards Sustained and Balanced Economic Growth (second annual review; Ottawa: The Queen's Printer, December, 1965), Table 5-13.

TABLE XXXIV

INDEXES OF AVERAGE ANNUAL INVESTMENT PER CAPITA, 1951-64, AND
OF CAPITAL STOCK OF MACHINERY AND EQUIPMENT, 1964, IN THE
CANADIAN PROVINCES (CANADA=100)

| Province | Index of Average Annual Investment, 1951-1964[a] Y8 | Index of Capital Stock in: | |
		All Industries 1964[b] Y9	Manufacturing Industries 1964[b] Y10
Newfoundland	66	54	40
Prince Edward Island	69	72	10
Nova Scotia	60	66	43
New Brunswick	64	68	60
Quebec	83	77	90
Ontario	105	112	145
Manitoba	96	107	45
Saskatchewan	110	149	21
Alberta	153	129	59
British Columbia	133	114	127
Canada	100	100	100

Sources: Economic Council of Canada, Towards Sustained and
Balanced Economic Growth (second annual review; Ottawa: The Queen's
Printer, December, 1965),[a]Table 5-11; [b]Table 5-12.

two years of secondary schooling in 1961. Values for these, labelled

Y11 and Y12, are presented in Table XXXV.

Correlational Relationships Between the Dependent and Independent
Variables

A listing of the fourteen variables examined follows:

X1 - 1961 personal income per capita

X2 - 1961 earned income per employed person

Y1 - Total population, 1961

Y2 - Per cent of total population living in urban areas, 1961

Y3 - Per cent of total population aged 20-64

Y4 - Per cent of total population living on farms, 1961

Y5 - Per cent of employed persons engaged in primary industries

Y6 - Per cent of employed persons engaged in secondary industries

Y7 - Per cent of employed persons engaged in service industries

Y8 - Indexes of average annual investment per capita, 1951-64

Y9 - Indexes of capital stock of machinery and equipment per capita
     in all industries, 1964

Y10 - Indexes of capital stock of machinery and equipment per capita in
     manufacturing industries, 1964

Y11 - Per cent of male adults of working age having more than two years
     of secondary schooling, 1961

Y12 - Per cent of female adults of working age having more than two years
     of secondary schooling, 1961

Pearson product moment correlation coefficients between the two

dependent variables and twelve independent variables were calculated and

TABLE XXXV

PERCENTAGE OF ADULT MALES AND FEMALES HAVING MORE THAN TWO
YEARS OF SECONDARY SCHOOLING, 1961 - CANADA AND THE
PROVINCES

Province	Per cent Male Y11	Per cent Female Y12
Newfoundland	18.0	23.8
Prince Edward Island	17.4	29.6
Nova Scotia	26.2	36.7
New Brunswick	20.7	30.8
Quebec	26.7	27.1
Ontario	34.3	39.5
Manitoba	32.0	39.7
Saskatchewan	25.3	37.3
Alberta	33.5	42.8
British Columbia	40.7	49.4
Canada	31.0	36.3

Sources: Table V, page 47, and Table IX, page 56.

are presented in Table XXXVI. Factors found to be related to the two

1961 income measures at statistically significant levels are indicated

in the table.

The seven factors, listed in order of size of their coefficients

of correlation, that were found to be related to 1961 personal income

per capita at the .01 level of confidence, were:

Y11 - per cent of male adults of working age having more than two years

      of secondary schooling, 1961;

 Y3 - per cent of total population aged 20-64, 1961;

Y12 - per cent of female population of working age having more than two

      years of secondary schooling, 1961;

 Y8 - indexes of average annual investment per capita, 1951-64;

 Y2 - per cent of population living in urban areas, 1961;

 Y9 - indexes of capital stock of machinery and equipment per capita

      in all industries, 1964; and,

Y10 - indexes of capital stock of machinery and equipment per capita

      in manufacturing industries, 1964.

The relationships between the dependent variable, X2, 1961

earned income per employed person, with the twelve independent variables

were essentially similar, with the exceptions that the factor Y9 did not

show a statistically significant relationship with X2, and that somewhat

smaller coefficients of correlation were found for most of the other

six factors. There was, as well, some change in the order of factors

in terms of the size of the correlation coefficients. For example,

the correlation coefficient between X2 and Y2, with a value of .766,

TABLE XXXVI

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS BETWEEN
THE DEPENDENT AND INDEPENDENT VARIABLES[a]
PROVINCIAL DATA

Independent Variables:	The Dependent Variables:	
	X1	X2
Y1	.547	.402
Y2	.763[c]	.766[c]
Y3	.932[c]	.746[c]
Y4	-.068	-.460
Y5	-.267	-.501
Y6	.380	.387
Y7	-.014	.436
Y8	.797[c]	.554[b]
Y9	.762[c]	.467
Y10	.716[c]	.669[b]
Y11	.949[c]	.865[c]
Y12	.834[c]	.743[c]

[a]For a list of variables, vide page 142.

[b]Denotes significance at the .05 level of confidence (.549 required for significance).

[c]Denotes significance at the .01 level of confidence (.716 required for significance).

places the factor Y2 second in size behind the value for Y11 in its

relation to X2, whereas it was in fifth position in its relationship

with X1.

The negative correlation coefficients between the two independent

variables Y4 and Y5 and the two dependent variables, while not of a

size to be statistically significant, should also be noted.

Interpretation of the Results

Of the seven factors that were found to be correlated at

statistically significant levels with the personal income per capita

measure, the highest coefficient was obtained for the adult male

educational level measure. The same factor had the highest correlation

coefficient of the six that related at statistically significant levels

with the earned income per employed person measure. In addition to

male adult educational levels, the results suggest that the degree of

interprovincial income disparities is closely associated with inter-

provincial differences in the degree of urbanization, the level of

capital inputs, the educational level of adult females, and the ratio

of the population of working age to total population.

Of the factors that were not statistically related to provincial

income levels, it should be noted that the factor Y4, the percentage

of the population living on farms, bears a negative and relatively large

correlation coefficient with the earned income per employed person

measure, suggesting a negative relationship between provincial wealth

and dependence on agriculture. This factor may be particularly

important in the cases of Prince Edward Island and Saskatchewan, both of
which had much higher concentrations of persons living on farms than the
other provinces. A similar negative tendency is noted for the Y5
factor--the percentage of employed persons engaged in the primary
industries.

There are undoubtedly many intercorrelations among the factors
which were found to have statistically significant relationships with
the two average provincial income measures. For example, the
degree of urbanization is probably closely related to the three measures
of capital inputs employed in the analysis. It is not, however, within
the scope of the present study to examine the interdependence among these
several factors. Such an examination could well be undertaken in
future research.

The significant finding of this section is that, of the twelve
factors selected for consideration, differences in educational attain-
ments of adult male populations correlate most highly with differences
in average income levels of Canadian provincial populations.

In the following section, further evidence concerning the
relationship between both the degree of urbanization and population
education levels and average income levels will be examined in the
context of Canadian metropolitan areas.

III. METROPOLITAN AREA DATA

The 1961 census reports provide statistics which make it
possible to test some of the factors used in the above section employing

provincial data in reference to Canadian metropolitan areas. In particular, it is intended to determine in this section whether differences in relative average wealth of people living in Canadian metropolitan centres are statistically related to the size of the metropolitan areas, and to differences in the educational levels of the adult populations living in these areas.

The Dependent Variables

Two dependent variables used as approximate measures of the relative well-being of metropolitan area populations are:

X1 - Average wage and salary income per family head, 1961

X2 - Average wage and salary income per employed male, 1961

Values for these in 1961 are presented in the first two columns of Table XXXVII.

The Independent Variables

Three independent variables were related to the dependent variables listed. These were:

Y1 - Total population of metropolitan area, 1961

Y2 - Per cent of non-school population having three to five years of secondary schooling, 1961

Y3 - Per cent of non-school population having university education, 1961

The derivation of these three factors is shown in Table XXXVII. It should be noted that the factor Y3 includes persons having some university education, as well as those having university degrees, and

TABLE XXXVII

AVERAGE INCOME, TOTAL POPULATION, AND EDUCATIONAL LEVELS IN CANADIAN METROPOLITAN AREAS, 1961

Metropolitan Area	Average Wage and Salary Income per:		Total Population 1961	Population Aged 5 and over Not Attending School:			Per cent:	
	Family Head X1	Employed Male X2	Y1	Total Years (a)	With 4-5 Years Sec. (b)	University (c)	(b)(a) Y2	(c)(a) Y3
Montreal, Que.	$4,407	$3,972	2,109,509	1,428,705	338,611	107,630	23.7	7.5
Toronto, Ont.	4,729	4,330	1,824,481	1,234,844	388,134	100,423	31.4	8.1
Vancouver, B.C.	4,637	4,219	790,165	538,001	190,876	49,514	35.5	9.2
Winnipeg, Man.	4,307	3,907	475,989	316,282	105,275	26,474	33.3	8.4
Ottawa, Ont.	4,877	4,407	429,750	269,769	88,279	28,832	32.7	10.7
Hamilton, Ont.	4,632	4,251	395,189	256,892	69,457	13,963	27.0	5.4
Quebec, Que.	4,069	3,559	357,568	233,336	55,183	16,141	23.6	6.9
Edmonton, Alta.	4,495	4,059	337,568	211,875	70,027	18,155	33.1	8.6
Calgary, Alta.	4,695	4,256	279,062	179,013	64,886	16,872	36.2	9.4
Windsor, Ont.	4,336	4,002	193,365	122,102	35,063	7,036	28.7	5.8
Halifax, N.S.	4,287	3,724	183,946	117,304	34,746	10,067	29.6	8.6
London, Ont.	4,405	4,000	181,283	118,798	40,361	8,487	34.0	7.1
Kitchener, Ont.	4,266	3,884	154,864	100,160	25,203	4,955	25.2	4.9
Victoria, B.C.	4,457	3,976	154,152	105,729	39,785	10,623	37.6	10.0
Regina, Sask.	4,462	4,012	112,141	73,031	24,987	6,010	34.2	8.2
Sudbury, Ont.	4,778	4,402	110,694	65,578	14,888	2,973	22.7	4.5
Saint John, N.B.	3,712	3,357	95,563	62,449	15,845	3,429	25.4	5.5
Saskatoon, Sask.	4,293	3,896	95,526	60,903	19,333	5,441	31.7	8.9
St. John's, Nfld.	3,763	3,381	90,838	54,838	15,150	3,030	27.6	5.5
Three Rivers, Que.	3,891	3,449	83,659	53,296	10,718	2,306	20.1	4.3
Oshawa, Ont.	4,537	4,252	80,918	52,170	14,233	2,155	27.3	4.1
Sherbrooke, Que.	3,598	3,222	70,253	44,452	9,165	2,507	20.6	5.6
Kingston, Ont.	4,429	3,978	63,419	41,805	13,494	3,585	32.3	8.6

Source: 1961 Census of Canada, Bulletin CT-1 to CT-23.

that both the Y2 and Y3 factors include both males and females. Separate categories for males and females are not provided in these census tabulations.

The Correlational Relationships Between Dependent and Independent Variables

Pearson product moment correlation coefficients were determined between the two dependent variables and three independent variables, and are presented in Table XXXVIII.

TABLE XXXVIII

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS BETWEEN THE
DEPENDENT AND INDEPENDENT VARIABLES RELATING TO
METROPOLITAN AREA DATA[a]

| Independent Variables | The Dependent Variables | |
	X1	X2
Y1	.295	.290
Y2	.546[c]	.500[c]
Y3	.464[b]	.334

[a]For a list of variables, vide page 148.

[b]Denotes significance at the .05 level of confidence (.359 required for significance).

[c]Denotes significance at the .01 level of confidence (.508 required for significance).

The results show no statistically significant relationship between the size of metropolitan areas, the factor Y1, and the two dependent variables.

Both the percentage of the non-school population having three or more years of secondary schooling, and the percentage of the non-school population having university education are related significantly to the X1 factor, the family head income measure, the first significant at the .01 level of confidence, and the second at the .05 confidence level. However, the relationship is much less close between the two educational level measures and the second income measure, X2. This income measure correlated with the Y2 factor, the percentage of the population having from three to five years of secondary schooling, at the .05 level of confidence; however, its relationship to the Y3 factor, the percentage of the non-school population with university education, was not statistically significant.

Another finding, not shown in the table, was the relationship between the population size of metropolitan areas, Y1, and the relative concentrations of persons with secondary school education and with university education, Y2 and Y3. The correlation between Y1 and Y2 was .005; the correlation between Y1 and Y3 was .230, neither of which is statistically significant.

The findings from this section must be interpreted in relation to those from the previous section. It was noted in Table XXXVI, page 145, that there was a high positive correlation between the degree of urbanization and the two provincial average income measures used. This result tends to suggest that the degree of urbanization, which may be interpreted by some to mean the existence of large urban centres, is a significant factor contributing to high average provincial income

levels. However, the results in this section do not seem to support this contention. The existence of large urban centres does not in itself appear to be an important factor in the determination of high average income levels; nor do large urban centres necessarily attract and hold large concentrations of well educated persons. The results of this section do suggest that urban centres which have, for whatever reasons, high concentrations of well educated persons will have higher average income levels than will urban areas whose populations include smaller proportions of people with high educational attainments, no matter what the size of the urban centres may be. The results also tentatively suggest that it may be more significant for the attainment of high average income levels to have high concentrations of working age persons with secondary school education than to have high concentrations of people with university training.

IV. THE RELATIONSHIP BETWEEN THE RELATIVE CONCENTRATIONS OF PERSONS WITH SPECIFIC LEVELS OF SCHOOLING AND THEIR AVERAGE INCOME LEVELS

It has been clearly established in this study that average incomes of Canadians, both individually and collectively, are directly related to their average educational levels. Individuals with high educational attainments tend to achieve higher incomes than do persons with lesser amounts of schooling. Provinces and metropolitan areas which have relatively high concentrations of persons with both secondary schooling and university education tend to have higher per capita income levels than do areas having smaller proportions of such persons.

It was also demonstrated in Chapters V and VI that gross differences exist among the Canadian provinces in average earnings accruing to persons having similar levels of schooling.

In this section it is sought to determine whether there is a relationship between the relative concentrations within provinces of persons with specific levels of educational attainment and the average earnings they achieve. It was noted in Chapter III that there were very substantial differences among the provinces in the proportions of individuals having specific levels of schooling. Table V (page 47) indicates, for example, that the proportion of males aged 20-64 having one to four years of elementary schooling varied from 22.5 per cent in Newfoundland to 3.9 per cent in British Columbia in 1961. This table shows that similar variations existed among the provinces in the relative concentrations of individuals having other levels of educational attainment.

The objective of this section is to determine if average incomes achieved by individuals having similar educational qualifications, for example, one to four years of elementary schooling, are higher or lower in provinces where such persons are relatively numerous than in provinces where they are relatively scarce.

The data employed in this section are again descriptive of Canadian family heads.

In Table XXXIX are presented tabulations of the 1961 percentage distributions in Canada and the provinces of family heads having eight levels of educational attainment, together with the average annual

TABLE XXXIX

PERCENTAGE DISTRIBUTION BY LEVEL OF SCHOOLING AND AVERAGE ANNUAL EARNINGS OF FAMILY HEADS, CANADA AND THE PROVINCES, 1961

Province	No Schooling % A1	No Schooling $ B1	Elementary 1-4 Years % A2	Elementary 1-4 Years $ B2	Elementary 5-8 Years % A3	Elementary 5-8 Years $ B3	Secondary 1-2 Years % A4	Secondary 1-2 Years $ B4
Canada	1.4	2,155	8.5	2,603	39.3	3,368	20.7	3,986
Newfoundland	6.7	1,957	23.7	2,136	34.5	2,718	18.1	3,289
Prince Edward Island	0.7	1,262	7.0	1,554	47.7	2,160	27.4	2,873
Nova Scotia	1.2	2,045	7.7	2,147	38.9	2,724	28.5	3,365
New Brunswick	3.2	1,528	12.9	1,885	46.2	2,619	17.8	3,445
Quebec	0.9	2,219	14.3	2,639	42.2	3,256	17.5	3,904
Ontario	0.9	2,518	4.8	2,877	40.5	3,575	20.5	4,185
Manitoba	2.6	2,080	8.6	2,494	34.5	3,195	22.7	3,863
Saskatchewan	2.8	1,589	8.6	2,218	42.9	3,082	20.8	3,686
Alberta	1.7	1,844	5.6	2,482	34.9	3,383	24.0	3,956
British Columbia	1.1	2,406	3.8	2,982	30.0	3,791	24.2	4,198
Pearson r:	-.177		-.317		-.624[a]		-.256	

TABLE XXXIX (continued)

Province	Secondary 3 Years % A5	Secondary 3 Years $ B5	Secondary 4-5 Years % A6	Secondary 4-5 Years $ B6	Some University % A7	Some University $ B7	University Degree % A8	University Degree $ B8
Canada	8.0	4,464	13.9	5,028	3.5	5,571	4.7	7,639
Newfoundland	9.6	4,152	3.9	4,655	2.2	4,961	1.3	7,379
Prince Edward Island	5.6	3,480	6.6	4,196	2.8	4,303	2.3	5,936
Nova Scotia	10.8	4,025	7.4	4,583	3.0	5,113	3.5	6,547
New Brunswick	8.1	4,225	6.1	4,240	2.8	4,771	2.8	6,565
Quebec	5.3	4,407	12.2	5,059	3.1	5,921	4.5	7,697
Ontario	8.3	4,615	16.4	5,227	3.2	5,826	5.4	7,914
Manitoba	12.3	4,449	11.1	4,711	4.1	5,131	4.0	7,289
Saskatchewan	7.8	5,231	10.9	4,577	3.0	4,832	3.2	6,983
Alberta	9.8	4,436	15.2	4,798	3.8	5,160	5.0	7,607
British Columbia	9.6	4,491	20.7	4,821	5.4	5,268	5.2	7,264
Pearson r:	.365		.665[a]		.247		.598[a]	

Source: 1961 Census of Canada, Bulletin 2:1-9, Table 80.

[a]Denotes significance at the .05 level of confidence (.549 required for significance).

155

earnings achieved during the year preceding May 31, 1961 by family heads

having each specified level of education. In the first section of

Table XXXIX it is indicated that 1.4 per cent of Canadian family heads

in 1961 had no formal schooling and they received annual earnings from

employment in 1961 of $2,155. In Newfoundland, 6.7 per cent of family

heads in 1961 had no schooling, and their average earnings from employ-

ment in that year were $1,957. Similar figures are presented for

Canada and the provinces for family heads having seven other levels

of educational attainment.

Pearson product moment correlation coefficients were calculated

between the provincial values in the two columns of each section of this

table, and their values are shown in the rows labelled "Pearson r." The

calculated correlation coefficient between the proportions of family

heads in the provinces with no schooling and their associated annual

earnings is -.177, a relationship that is not statistically significant.

The corresponding correlation coefficients for the other seven sections

of the table are similarly indicated. Statistically significant

correlational relationships are noted.

It will be noted that the correlations are negative for the first

four educational level categories, and positive for the last four.

While their values in the "no schooling," "1-4 years elementary," and

"1-2 years secondary" groupings are not statistically significant, the

correlation for the "5-8 years elementary" group is -.624, significant

at the .05 confidence level. Similarly, the values for the "4-5 years

secondary" and "university degree" classifications, at .665 and .598

respectively, are significant at the .05 level.

These results suggest that annual earnings of family heads having two years of secondary schooling or less tend to be lower in provinces where such persons are numerous, and higher in those provinces where they are more scarce, and that this trend is particularly apparent in the case of those having 5-8 years of elementary education, a group which makes up approximately forty per cent of Canadian family heads. Conversely, annual earnings of family heads having three or more years of secondary schooling and with university education tend to be higher in provinces having large proportions of persons possessing higher educational qualifications, particularly in the cases of those with four or five years of secondary schooling and with university degrees.

Confirmation of the above findings is presented in Table XL, where population sample data from the 1961 Census of Canada are presented. It will be noted in this table that only six classifications of educational attainment are employed. Pearson product moment correlation coefficients showing the relationships between 1961 provincial concentrations of males aged fifteen and over having the following levels of schooling and their average total incomes were: no schooling: -.483, kindergarten and elementary: -.733, one to three years secondary: -.056, four to five years secondary: +.735, some university: +.158, and university degree: +.753. The correlational relationships for the "kindergarten and elementary," "four and five year secondary," and "university degree" classifications are all significant at the .01 level of confidence.

TABLE XL

PEARSON PRODUCT MOMENT CORRELATION COEFFICIENTS CALCULATED BETWEEN
PERCENTAGE DISTRIBUTION OF MALES AGED FIFTEEN AND OVER BY LEVEL
OF SCHOOLING AND AVERAGE TOTAL ANNUAL INCOME, BY
BY PROVINCES, 1961

Province	No Schooling		Kindergarten & Elementary		Secondary 1-3 Years	
	%	$	%	$	%	$
Newfoundland	5.5	1,449	52.6	2,210	34.1	3,179
Prince Edward Island	-	-	48.5	2,185	35.1	3,150
Nova Scotia	1.3	1,448	44.6	2,378	39.5	3,425
New Brunswick	2.9	1,467	54.8	2,476	27.9	3,654
Quebec	0.9	1,746	49.0	3,065	27.4	3,793
Ontario	0.9	2,218	40.7	3,438	31.6	4,136
Manitoba	2.2	1,477	35.9	2,943	38.5	4,039
Saskatchewan	2.5	1,235	42.4	2,869	32.0	3,729
Alberta	1.4	1,471	33.9	3,236	36.3	4,032
British Columbia	1.1	1,731	31.8	3,340	35.4	4,074
Pearson r:	-.483		-.733[a]		-.056	

Province	Secondary 4-5 Years		Some University		University Degree	
	%	$	%	$	%	$
Newfoundland	4.1	3,886	2.6	4,109	1.2	8,133
Prince Edward Island	9.0	3,889	4.7	3,840	2.7	6,823
Nova Scotia	7.8	4,265	3.5	4,527	3.3	7,722
New Brunswick	8.0	3,722	3.6	4,087	2.8	7,569
Quebec	14.1	4,937	4.3	5,325	4.3	9,001
Ontario	17.6	5,070	4.0	5,301	5.3	9,370
Manitoba	13.3	4,492	5.7	4,574	4.4	8,545
Saskatchewan	14.5	4,256	4.6	4,223	4.0	8,625
Alberta	18.1	4,582	4.9	4,749	5.4	9,309
British Columbia	20.9	4,509	6.1	4,597	4.8	8,796
Pearson r:	.735[a]		.158		.753[a]	

Source: 1961 Census of Canada, Bulletin 4:1-1, Table A9.

[a] Denotes significance at the .01 level of confidence (.716
required for significance).

These findings would suggest that the differences among the provinces in average annual earnings of persons with elementary education, with four and five years of secondary education, and with university degrees are not randomly distributed, but tend to vary in a predictable manner. The results show an inverse relationship between average annual earnings of persons having elementary school education and the relative concentration of such persons within provinces. Conversely, they show a direct relationship between the relative concentrations within provinces of persons with three to five years of secondary schooling and with university degrees and the average incomes they achieve.

Hence, provinces having large proportions of persons with elementary schooling and small proportions of persons with complete secondary school standing and with university degrees will have low average levels of income relative to other provinces. This occurs not only because of the "close association between average income and the level of educational attainment"[8] that previous studies have clearly shown, but also because of the lower relative average incomes achieved by persons with given levels of schooling in provinces in which the average level of educational attainments, in comparison with other provinces, are relatively low.

V. SUMMARY

The relative significance of differences in educational levels of Canadian provincial populations in accounting for interprovincial income

disparities was examined in this chapter.

In the first section of the chapter twelve factors, including two measures of adult educational levels which have been cited as contributing to Canadian regional income disparities, were related statistically to two average provincial income figures. Using 1961 data, Pearson product moment correlation coefficients were calculated between the twelve factors and the average income measures. Seven of the twelve selected factors were found to be related at statistically significant levels of confidence to the 1961 personal income per capita measure, while six were significantly related to 1961 earned income per employed person. The highest degree of relationship with both income measures was found for the educational level factor, the percentage of males of working age having more than two years of secondary schooling. The Spearman r was calculated to be .949 with the personal income per capita measure, and .865 with the earned income per employed person measure. Other factors found to be related at statistically significant levels to average provincial income levels included the degree of urbanization, the percentage of the total population aged 20-64, the percentage of females of normal working age having more than two years of secondary education, and the level of capital inputs. No statistically significant relationships were found between the two average income measures and total population, percentage of total population living on farms, or the percentages of employed persons engaged in the primary, secondary or service industries.

In the second section of the chapter, metropolitan area data were

examined to determine the significance of the relationship between two

measures of relative wealth of Canadian metropolitan areas and three

factors: population size, percentage of non-school population having

three to five years of secondary school education, and percentage of

non-school population having university education. The results showed

no significant relationship between metropolitan area population size

and the average income measures. Significant relationships were found

between the two educational level measures and the income level measure.

The results suggest that average incomes in these areas may be more

closely associated with the relative concentration of persons having

three to five years of secondary schooling than with the percentage of

persons with university education.

The final section of this chapter examined the influence of

relative concentrations within the Canadian provinces of persons with

specific levels of educational attainment in explaining interprovincial

differences in the education-earnings relationship. The results of

this section indicated that average annual earnings of persons with

elementary education tend to be lower in provinces where such persons

are relatively numerous. Conversely, average earnings of individuals

with three, four and five years of secondary school education and with

university degrees tend to be higher in those provinces which have

relatively high percentages of persons with these educational qualifica-

tions.

Persons with grade school education tend to have higher average

incomes in provinces which have low percentages of working age adults

with this level of schooling.   Persons with three or more years of

secondary education and with university degrees tend to earn higher

average incomes in provinces which have relatively high concentrations

of persons with these levels of educational attainment.

FOOTNOTES FOR CHAPTER VII

[1]Economic Council of Canada, Towards Sustained and Balanced Economic Growth (second annual review; Ottawa: The Queen's Printer, December, 1965), Chapter V.

[2]1961 Census of Canada, Bulletins CT-1 to CT-23.

[3]The total population factor was included in the analysis because of the apparent general relationship between population size and average provincial wealth. The provinces with small populations, particularly the Maritime provinces, have tended to have low per capita income levels, while the larger provinces, particulary Ontario, have tended to have high average income levels. It was sought to·examine the statistical significance of this apparent relationship.

[4]In the 1961 census an "urban area" was considered essentially to be a community containing at least 1,000 inhabitants.
The general significance of the Y2 factor, the degree of urbanization, as well as the other independent variables Y3 to Y12, in relation to Canadian regional income disparities, are discussed in: Economic Council of Canada, op. cit.

[5]The primary industries include: agriculture, forestry, fishing, trapping, mining, quarrying, and oil wells.

[6]Secondary industries consist of the manufacturing and construction sectors.

[7]The service sector includes the following divisions: transportation, communications and utilities; finance, insurance and real estate; community, business and personal services; public administration and defence; and "others."

[8]Economic Council of Canada, op. cit., p. 119.

CHAPTER VIII

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

I. SUMMARY

This study has been concerned with the economic value of education in Canada and the provinces. There were two major parts to the study.

In the first major section, average levels of educational attainment of the adult male populations of the Canadian provinces were determined and these were correlated with average provincial income figures to determine the general degree of relationship between education and income variables in Canada. The data used in this part of the study were obtained from 1951 and 1961 Census of Canada tabulations and from the National Accounts.

The second major section of the study involved a determination of the education-earnings relationship for each of the Canadian provinces. This was designed as a complementary study to the J. R. Podoluk investigation for the Dominion Bureau of Statistics, which found for Canada as a national unit a strong positive association between the average level of educational attainment of individuals and average annual and lifetime earnings. It was sought to determine if annual and lifetime earnings accruing to individuals having specific educational qualifications were relatively similar in all parts of Canada. Data from the 1961 Census of Canada reports were used in this part of the study. Average annual and

lifetime earnings of persons having eight levels of educational attainment were determined for each province, and interprovincial comparisons were made. The last part of this section was devoted to an examination of the relative significance of differences in the levels of schooling of adult provincial populations in explaining Canadian interprovincial income disparities.

II. CONCLUSIONS

The major findings of this study may be summarized as follows:

1. Major differences exist in the educational levels of Canadian provincial adult populations. There appeared to be a definite trend towards a geographic ordering among the Canadian provinces in this regard, with the five western provinces having larger proportions of well educated persons of working age then the five eastern provinces. Among the western provinces, adult males in British Columbia had the highest mean and median levels of schooling; Alberta, Manitoba and Ontario were roughly equal in these measures; and Saskatchewan was lowest. Among the five eastern provinces of Canada, Nova Scotia was highest in these measures, followed by Quebec and Prince Edward Island which were about equal and ahead of New Brunswick and Newfoundland. There was no evidence to suggest that interprovincial differences in the educational levels of male adults were diminishing during recent decades.

Female adults in Canada, despite smaller proportions with university education, have tended to have higher average levels of educational attainment than males. Interprovincial variations in the level of

schooling of adult females tended to parallel the differences found

among males.

2. Substantial differences in average income levels of Canadian

provincial populations were found. Income measures employed were

personal income and earned income, per capita and per employed person,

in 1951 and 1961. Interprovincial disparities in income appeared to be

narrowing slightly during this period.

3. Very high correlations were found between all average

provincial income measures and both mean and median measures of educa-

tional attainment of provincial adult males in 1951 and 1961. All

correlations were found to be significant at at least the .05 level of

confidence.

4. Very substantial differences were found in the education-

earnings relationship among the Canadian provinces, both for males and

females. For males, interprovincial differences in average annual and

lifetime earnings were found to be greatest for persons with no

schooling, with elementary schooling, and with one or two years of

secondary school education. Differences among the provinces in average

annual and lifetime earnings were least for persons with four and five

years of secondary schooling. The coefficients of variation in average

annual earnings among the provinces in 1961, expressed in per cent,

were found to be: no schooling--20.4, one to four years elementary--

18.8, five to eight years elementary--16.0, one to two years secondary--

11.6, three years secondary--7.6, four and five years secondary--6.8,

some university--9.3, and university degree--8.4. An indication of the

extent of these variations is given by comparing these figures with the 1961 earned income per employed person, which were found to have a coefficient of variation among the provinces of 14.1 per cent.

Interprovincial differences were found to be greatest for younger and older persons of working age, and least for persons in the middle years of their working careers, for all educational level classifications.

Similar variations in average earnings accruing to females with specific levels of educational attainment were noted among the Canadian provinces.

5. Substantial differences among the provinces in incremental lifetime earnings associated with increased schooling were found. Interprovincial comparisons between marginal earnings associated with secondary schooling and percentages of 15-19 year olds in attendance at school suggested that provincial populations were not attending school in economically optimal proportions. In those provinces in which incremental lifetime earnings associated with secondary schooling were calculated to be greatest, actual enrolment figures of this age group were lowest in 1961. Similarly, those provinces in which incremental lifetime earnings were least had the highest school enrolments of this age group.

Provincial enrolments of persons of university age, the 20-24 year olds, tended to more closely parallel incremental lifetime earnings expectations.

6. The study suggests that Canadian interprovincial income

disparities can be "explained" or accounted for to a greater extent by differences in adult population educational levels than by interprovincial differences in many other factors often cited as contributory factors. Of twelve factors selected for consideration, educational levels of provincial adult male populations correlated most highly with average provincial income levels, with correlation coefficients in the order of .900, significant beyond the .01 level of confidence. Statistically significant relationships were also found between average provincial income figures and the percentage of populations of normal working age, the educational level of female adults, the degree of urbanization, and the level of capital inputs. Calculations based on Canadian metropolitan area data suggested that the relative concentration of persons with three to five years of secondary schooling may be more closely related to average income levels than the relative concentration of persons with university education.

7. Differences in the education-earnings relationship among the Canadian provinces appear to be related to the relative concentrations within provinces of persons with specific levels of educational attainment. A statistically significant inverse relationship was found between the percentage of male adults with elementary schooling and the average earnings of persons with elementary school education. For persons with three to five years of secondary school education and with university degrees, a statistically significant direct relationship was found between their concentrations within provinces and their average annual earnings.

III. IMPLICATIONS AND RECOMMENDATIONS

The findings of this study may be compared with those of other research investigations previously undertaken in Canada which were discussed in the first two chapters of this report. There are also certain implications for the financing of education in Canada which derive from this study, as well as suggestions for further research in the economics of education arising from this investigation.

The Podoluk study confirmed the existence of a direct relationship between increased education and both annual and lifetime earnings of male labour force members in Canada, when the nation was considered as a whole.[1] The present study suggests that the general findings of the Podoluk investigation hold true within each of the provinces, but demonstrates that there are gross differences in the education-earnings relationship when interprovincial comparisons are made of earnings accruing to individuals with specific levels of schooling.

Gideon Rosenbluth, in a study of the remunerations of Canadian engineers and scientists, found no regional differences in their earnings.[2] The findings of the present study indicate that, while interprovincial differences in incomes of persons with higher educational qualifications--those with 4-5 years of secondary schooling and university education--are not relatively large, differences for persons having lesser educational attainments, who make up the bulk of the Canadian work force, are of a substantial order, similar in degree to interprovincial variations in earned income per employed

person. This finding tends to support a conclusion reached by Isabel

M. Anderson in a study of internal migration in Canada. Much of the

population movement in Canada, according to this study, is motivated

by economic considerations.[3] It is possible that Canada's "kinetic

population," to use John Porter's term,[4] may be explained to a

considerable extent by these interprovincial differences in the educa-

tion-earnings relationship.

These differences in the earnings of persons with similar

educational qualifications among the Canadian provinces, together with

the Canadian internal migration with which they are apparently

associated, suggest certain implications in the area of educational

finance in Canada. Canadians who receive their schooling in one of

Canada's economically disadvantaged provinces, and at considerable

expense to the people of that province, often have an economic

incentive to migrate. This study suggests, for example, that it

would be advantageous for persons with three to five years of

secondary education, and with university degrees, to move from pro-

vinces which have small proportions of persons with these educational

qualifications to provinces having larger numbers of people with

similar amounts of schooling. Such migration is likely to be econo-

mically beneficial both to the individuals who move and to the receiving

provinces, but may well be regarded as a direct financial investment

loss by the sending provinces. As Anderson has noted:

> Migration out of a relatively lagging region will tend to be
> concentrated in the younger and better educated groups of the
> population whose retention in the region would provide a potential

for growth in per capita output and income. The benefits, to the region, of out migration and larger investments in education are less clear under these conditions.[5]

Holtzman has suggested that a "net-benefit-maximizing community" will not be likely to "invest in an individual's education unless it can reap the benefits from this education."[6] Provinces with lagging economies will find it difficult to make the financial sacrifices necessary to provide the massive expenditures needed to give their young people the secondary school and university facilities and programs required in an advanced industrialized society, particularly if a significant proportion of the graduates from such institutions leave these provinces to work elsewhere. If individual provinces are to continue to finance the major costs of educating their own populations, "mobility deprivation" through "educational deprivation"[7] may well continue to be a feature of life for many young Canadians, especially in the poorer provinces.

Federal assistance is already being provided in significant amounts to provinces for post-secondary education.[8] This study suggests that there are valid reasons in favour of federal financial assistance, particulary to provinces with low average income levels, for expenditures at the secondary school level.

The Denton study for the Economic Council of Canada found that differences in educational levels of the male non-school population aged five and over in Canada's five major economic regions did not account for much of the regional variations in earnings of labour force members.[9] The present study suggests that one of the reasons for

this negative finding may have been a technical one, in that the three

educational level categories used in the Denton analysis may not have

been sufficiently discriminatory. The major difference in the educa-

tional attainments of adult provincial populations appears to be in

the number of persons having from three to five years of secondary

schooling. Hence, it is suggested that a repetition of the Denton study,

using different educational level classifications, and using the ten

provinces instead of the five economic regions, could well lead to

different conclusions.

A natural extension of the present study would involve a

determination of the relationship between costs and benefits of several

levels of educational attainment within the Canadian provinces. It

was noted in Chapter VI that incremental lifetime earnings accruing to

individuals who have completed their secondary schooling appeared to

be highest in those provinces in which the enrolments of the fifteen

to nineteen year olds were the lowest. A detailed cost-benefit analy-

sis of secondary school education within provinces would provide

valuable evidence both for individuals and for policy makers with

respect to high school enrolments and the financing of secondary

education across Canada.

In order for such cost-benefit investigations to take place, it

is recommended that studies be carried out within all the provinces to

determine total implicit and explicit costs of secondary and other

levels of education during the 1971 decennial census year. It is

further recommended that more detailed tabulations be provided in the

1971 <u>Census</u> <u>of</u> <u>Canada</u> reports of the earnings and income accruing to
provincial populations having specific levels of educational attain-
ment.

FOOTNOTES FOR CHAPTER VIII

[1]J. R. Podoluk, _Education and Earnings_ (Ottawa: Dominion Bureau of Statistics, December, 1965).

[2]Gideon Rosenbluth, "Salaries of Engineers and Scientists," _Papers_, Canadian Political Science Association, Conference on Statistics, 1960. Eds. E. F. Beach and J. C. Weldon (Toronto: University of Toronto Press, 1962).

[3]Isabel B. Anderson, _Internal Migration in Canada_, 1921-61 (Staff Study No. 13; Ottawa: Economic Council of Canada, March, 1966).

[4]John Porter, _The Vertical Mosaic_ (Toronto: University of Toronto Press, 1965), p. 33.

[5]Anderson, _op. cit._, p. 44.

[6]A. G. Holtzman, Book Review, _Journal of Political Economy_, LXXV: 3 (June, 1967), pp. 310-11.

[7]These are again John Porter's terms. _Vide_: Porter, _op. cit._, p. 49.

[8]Total federal government expenditures on education in Canada in 1967 were estimated to be $818.0 million, while the total bill for education in Canada that year was estimated to be $4,539.0 million. The corresponding figures in 1965 were $339.2 million and $3,277.1 million. _Vide_: Dominion Bureau of Statistics, _Preliminary Statistics of Education_ (Ottawa: The Queen's Printer, 1968).

[9]Frank T. Denton, _An Analysis of Interregional Differences in Manpower Utilization and Earnings_ (Staff Study No. 15; Ottawa: Economic Council of Canada, April, 1966), p. 11.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS AND MONOGRAPHS

Anderson, C. Arnold and Mary Jean Bowman (eds.). Education and Economic Development. Chicago: Aldine Publishing Company, 1963.

Becker, Gary S. The Economics of Discrimination. Chicago: University of Chicago Press, 1957.

_____. Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education. New York: National Bureau of Economic Research, Columbia University Press, 1964.

Blaug, M. The Economics of Education: A Selected Bibliography. Oxford: The Pergammon Press, 1966.

Bowen, William G. Economic Aspects of Education. Princeton, N.J.: Industiral Relations Section, Department of Economics, Princeton University Press, 1964.

Bowman, Mary Jean and W. Warren Haynes. Resources and People of East Kentucky. Baltimore: The John Hopkins Press, 1963.

Cama, P., E. P. Weeks and Z. W. Sametz. Economic Geography of Canada. Toronto: MacMillan, 1964.

Cheal, John E. Investment in Canadian Youth. Toronto: MacMillan, 1963.

Correa, H. The Economics of Human Resources. Amsterdam: North Holland Publishing Company, 1963.

Denison, Edward F. The Sources of Economic Growth and the Alternatives Before Us. New York: Committee on Economic Development, 1962.

Dorfman, Robert. The Price System. Englewood Cliffs, N.J.: Prentice-Hall, Incorporated, 1964.

Easterlin, Richard A., "A Note on the Evidence of History," in: C. Arnold Anderson and Jean Bowman (eds.). Education and Economic Development. Chicago: Aldine Publishing Company, 1963.

Edding, Friedrich. International Trends in Educational Expenditures. Kiel: Kiel University Press, 1958.

Ferguson, George A. Statistical Analysis in Psychology and Education. Second edition. New York: McGraw-Hill Book Company, 1966.

Galbraith, John K. Economic Development in Perspective. Cambridge: Harvard University Press, 1963.

Graham, John F. Fiscal Adjustment and Economic Growth: A Case Study of Nova Scotia. Toronto: University of Toronto Press, 1963.

Harbison, Frederick and Charles A. Myers. Education, Manpower and Economic Growth. New York: McGraw-Hill Book Company, 1964.

Kaser, M. C. "Education and Economic Progress: Experience in Industrialized Market Economies," in: E. A. G. Robinson and John E. Vaizey (eds.). The Economics of Education. London: MacMillan, 1966.

Koulourianos, Dmitri Th. Educational Planning for Economic Growth. Technical Report No. 23, Center for Research in Management Science. University of California, Berkeley, California, February, 1967.

Leftwich, Richard H. The Price System and Resource Allocation. Third edition. New York: Holt, Rinehart and Winston, 1966.

Lindauer, John. Macroeconomics. New York: John Wiley and Sons, 1968.

Machlup, Fritz. The Production and Distribution of Knowledge in the United States. Princeton, N.J.: Princeton University Press, 1962.

Maddison, Angus. "Growth Problems in Underdeveloped Countries," in: Herbert S. Parnes (ed.). Planning Education for Economic and Social Development. Paris: Organization for Economic Cooperation and Development, 1962.

McClelland, David C. The Achieving Society. New York: D. Van Nostrand Company, 1961.

McNemar, Quinn. Psychological Statistics. Second edition. New York: John Wiley and Sons, 1955.

Miner, Jerry. Social and Economic Factors in Spending for Public Education. Syracuse, N.Y.: Syracuse University Press, 1963.

Moffatt, H. P. Educational Finance in Canada. Quance Lectures in Canadian Education. Toronto: W. J. Gage, 1957.

National Education Association. Financial Status of the Public Schools. Washington, D.C.: Committee on Education Finance, The Association, 1966.

North, Douglas C. Growth and Welfare in the American Past: A New Economic History. Englewood Cliffs, N.J.: Prentice-Hall, 1966.

Parnes, Herbert S. _Forecasting Educational Needs for Economic and Social Development_. Paris: Organization for Economic Cooperation and Development, 1962.

_____ (ed.). _Planning Education for Social and Economic Development_. Paris: Organization for Economic Cooperation and Development, 1962.

Porter, John. _The Vertical Mosaic_. Toronto: University of Toronto Press, 1965.

Robinson, E. A. G. and John Vaizey (eds.). _The Economics of Education_, London: MacMillan, 1966.

Rosenbluth, Gideon. "Salaries of Engineers and Scientists," in: E. F. Beach and J. C. Weldon (eds.). _Papers_. Canadian Political Science Association, Conference on Statistics, 1960. Toronto: University of Toronto Press, 1962.

Russett, Bruce M. _et al_. _World Handbook of Social and Political Indicators_. New Haven: Yale University Press, 1964.

Schultz, Theodore W. _The Economic Value of Education_. New York: Columbia University Press, 1963.

Siegel, Barry N. _Aggregate Economics and Public Policy_. Homewood, Ill.: Richard D. Irwin, 1965.

Stonier, Alfred W. and Douglas C. Hague. _A Textbook of Economic Theory_. Third edition. London: Longmans, Green and Company, 1964.

Vout, T. R. "The Canadian Manufacturing Industry, 1900-1957," in: E. F. Beach and J. C. Weldon (eds.). _Papers_. Canadian Political Science Association, Conference on Statistics, 1960. Toronto: University of Toronto Press, 1962.

Weldon, John C. "On the Economics of Social Democracy," in: John Deutsch _et al_. _The Canadian Economy_. Revised edition. Toronto: MacMillan, 1965.

Whalen, Hugh. "Public Policy and Regional Development: The Experience of the Atlantic Provinces," in: Abraham Rotstein (ed.). _The Prospect of Change: Proposals for Canada's Future_. Toronto: McGraw-Hill Book Company, 1965.

B. JOURNAL ARTICLES

Aukrust, Odd. "Investment and Economic Growth," <u>Productivity</u> <u>Management</u> <u>Review</u> (February, 1959), pp. 35-53.

Becker, Gary S. and Barry R. Chiswick. "Education and the Distribution of Earnings," <u>American</u> <u>Economic</u> <u>Review</u>, LXVI:2 (1966), pp. 358-69.

Benson, Charles S. "Economics and Education," <u>Review</u> <u>of</u> <u>Educational</u> <u>Research</u>, XXXVI:1 (February, 1967), pp. 96-102.

Blaug, M. "An Economic Interpretation of the Private Demand for Education," <u>Economica</u>, XXXIII (May, 1966), pp. 166-82.

_____. "The Rate of Return on Investment in Education in Great Britain," <u>The</u> <u>Manchester</u> <u>School</u> <u>of</u> <u>Economics</u> <u>and</u> <u>Social</u> <u>Studies</u>, XXXIII (September, 1965), pp. 205-51.

Bowman, Mary Jean. "Human Inequalities and Southern Economic Development," <u>Southern</u> <u>Economic</u> <u>Journal</u>, XXXII:1, Part 2 Supplement (July, 1966), pp. 73-102.

_____. "Schultz, Denison and the Contribution of 'Eds' to National Income Growth," <u>Journal</u> <u>of</u> <u>Political</u> <u>Economy</u>, LXXII (October, 1964), pp. 450-64.

Curle, A. "Education, Politics and Development," <u>Comparative</u> <u>Education</u> <u>Review</u>, VII:3 (1963), pp. 226-45.

Green, Alan G. "Regional Aspects of Canada's Economic Growth, 1890-1929," <u>Canadian</u> <u>Journal</u> <u>of</u> <u>Economics</u> <u>and</u> <u>Political</u> <u>Science</u>, XXXIII:2 (May, 1967), pp. 232-45.

Hansen, Niles G. "Human Resources and Regional Development: Some Lessons from French Experience," <u>Southern</u> <u>Economic</u> <u>Journal</u>, XXXIV:1 (July, 1967), pp. 123-32.

Hanson, W. Lee. "Total and Private Rates of Return to Investments in Schooling," <u>Journal</u> <u>of</u> <u>Political</u> <u>Economy</u>, LXXI (1963), pp. 128-40.

Holtzman, A. G. Book Review. <u>Journal</u> <u>of</u> <u>Political</u> <u>Economy</u>, LXXV:3 (June, 1967), pp. 310-11.

Hunter, Chester L. and Thomas R. McHale, "Education and Phillipine Economic Development," <u>Comparative</u> <u>Education</u> <u>Review</u>, IX (February, 1965), pp. 15-22.

Lassiter, Roy L. Jr. "The Association of Income and Education for Males, By Region, Race and Age," Southern Economic Journal, XXXII:1 (July, 1965), pp. 15-22.

Mincer, Jacob. "Investment in Human Capital and Personal Income Distribution," Journal of Political Economy, LXVI:4 (August, 1958), pp. 281-302.

Peaslee, Alexander L. "Primary School Enrolments and Economic Growth," Comparative Education Review, XI (February, 1967), pp. 57-67.

Scott, Anthony. "The Economic Goals of Government Finance," Public Finance, III (March, 1965), pp. 241-93.

Singh, Bhagwant. "Italian Experience in Regional Economic Development and Lessons for Other Countries," Economic Development and Cultural Change, XV:3 (April, 1967), pp. 315-22.

Wolfe, D. and J. G. Smith. "The Occupational Value of Education for Superior High School Graduates," Journal of Higher Education, XXVII (1956).

Wonnacott, R. J. "Wage Levels and Employment Structure in United States Regions: A Free Trade Precedent," Journal of Political Economy, LXXII:4 (August, 1964), pp. 414-19.

C. GOVERNMENT PUBLICATIONS

Anderson, Isabel B. Internal Migration in Canada, 1921-61. Staff Study No. 13, The Economic Council of Canada, Ottawa, March, 1966.

Bertram, Gordon W. The Contribution of Education to Economic Growth. Staff Study No. 12, The Economic Council of Canada, Ottawa, June, 1966.

Chernick, S. E. Interregional Disparities in Income. Staff Study No. 14, The Economic Council of Canada, Ottawa, August, 1966.

Denton, Frank T. An Analysis of Interregional Differences in Manpower Utilization and Earnings. Staff Study No. 15, The Economic Council of Canada, Ottawa, August, 1966.

Department of Labour. Wage Rates, Salaries and Hours of Labour. Report No. 48. Economics and Research Branch, Ottawa, 1966.

_____. Women at Work in Canada. Ottawa, 1964.

Dominion Bureau of Statistics. Canada Life Tables, 1960-1962. Ottawa: The Queen's Printer, December, 1963.

_____. Census of Canada, 1941, 1951, 1961, 1966.

_____. The Organization and Administration of Public Schools in
    Canada. Third edition. Ottawa: The Queen's Printer, December, 1966.

_____. National Accounts, Income and Expenditure, 1926-56, 1962, 1966.

_____. Preliminary Statistics of Education, 1967-68. Ottawa, 1968.

_____. Student Progress Through the Schools by Age and Grade, 1965.
    Ottawa, February, 1966.

Economic Council of Canada. Towards Sustained and Balanced Economic
    Growth. Second Annual Review. Ottawa, 1965.

Podoluk, J. R. Education and Earnings. Ottawa: Dominion Bureau of
    Statistics, December, 1965.

Scoville, J. G. The Job Content of the Canadian Economy. Special
    Labour Force Study No. 3. Ottawa: Dominion Bureau of Statistics,
    April, 1967.

Statutes of Great Britain, 30-31 Victoria, Ch. 3 (1867).

Wilkinson, Bruce M. Studies in the Economics of Education. Ottawa:
    Department of Labour, Economics and Research Branch, July, 1965.

D.   OTHER SOURCES

Financial Times of Canada, February 26, 1968.

Paterson, Ian W. "An Analysis of Determinants of Education Expenditures
    Among the Canadian Provinces Decennially, 1941-61," Unpublished
    Doctoral dissertation, University of Alberta, Edmonton, 1967.

Shapiro, S. "An Analysis of Current Public and Societal Expenditures
    per Pupil in Elementary and Secondary Schools." Unpublished Doctoral
    dissertation, University of Chicago, 1962.

APPENDIX

COMPUTATION OF MEAN AND MEDIAN YEARS OF SCHOOLING

Measures of central tendency of population educational levels are useful in making comparisons of the level of educational attainment of a population between time periods, and among population groups at a specific time. A number of assumptions must be made when such measures are calculated. In this study it was assumed (_vide_ pp. 12-13), that a year of schooling attained in any province in any year was equivalent to a year of schooling attained elsehwere in the same or any other year. This assumes horizontal equivalence between grades among the several provincial school systems, intertemporal equivalence between a year of schooling attained recently and many years ago, and vertical linearity between grades.

This general assumption of equivalence of years of schooling was made for several reasons: first, because of the difficulty in obtaining data on interprovincial differences in the quality of schooling; second, because of the problems involved in assessing approximate weights for schooling attained in different years; and third, because of the absence of data concerning the relative increase in the educational stock of individuals and groups contributed by the attainment of specific school grades.

In addition to this general assumption relating to both measures of central tendency of population educational levels, specific assumptions were necessary for the determination of educational means and medians. These are discussed below.

Mean Years of Educational Attainment

The mean year of education of a population represents a measure which reflects each year of school attendance of every member of the population. Since each year of schooling is given equivalent weight, the employment of the mean represents the quantification of the total educational stock of a population at a given time. Hence, means may be useful in comparing the educational stock among different populations at a given time, or for assessing changes in the stock of a given population over time.

Because census tabulations provide data on population educational attainments for the Canadian provinces in relatively broad grade groupings rather than for single grades, means have to be chosen to represent each such classification. The mean years arbitrarily selected for this study to represent census classifications of years of schooling were as follows: no schooling--0 years; one to four years elementary--3.5 years; five to eight years elementary--7.0 years; one to two years secondary--9.5 years; three years secondary--11.0 years; four and five years secondary--12.5 years; some university--14.5 years; and university degree--17.0 years.

Median Years of Schooling

The median measure of educational attainment is defined as the value which divides a population group into two equal parts--one-half having completed more schooling and one-half completing less schooling than the median. When medians are calculated it is assumed that census

tabulations of population educational levels represent a continuous

series of numbers from 0.0 years for persons with no schooling to the

number of years of schooling representing the highest educational

levels of population members shown in the tabulations. Persons com-

pleting a given year of schooling are assumed to be distributed evenly

within the interval from .0 to .9 of that year. Where census data show

population educational attainments in broader categories than single

years, that is, five to eight years of elementary schooling, it is

assumed that the persons within the classification are evenly distri-

buted throughout the entire interval, for example, from 5.0 to 8.9 years.